



Government of Nepal

Ministry of Federal Affairs and General Administration

Singha Durbar, Kathmandu

Initial Environmental Examination (IEE)

Upgrading of Lubughat-Galpa-Doramba Road (33.75 km),

Ramechhap District, Bagmati Province

Submitted to:

Government of Nepal

Ministry of Federal Affairs and General Administration

Singha Durbar, Kathmandu

Proponent:

Government of Nepal

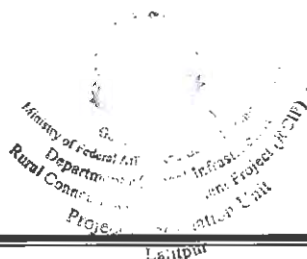
Ministry of Federal Affairs and General Administration

Department of Local Infrastructure (DoLI)

Rural Connectivity Improvement Project (RCIP)

Pulchowk, Lalitpur

August, 2022



Acronyms and Abbreviations

| | |
|-----------------|---|
| AIDS | Acquired Immune Deficiency Syndrome |
| AP | Affected People |
| BPM | Bituminous Penetration Macadam |
| BS | Bikram Samvat |
| CBOs | Community Based Organization |
| CBS | Central Bureau of Statistics |
| CDC | Compensation Determination Committee |
| CFUG | Community Forest User Group |
| CITES | Convention on International Trade in Endangered Species of Wild Fauna and Flora |
| CO | Carbon Monoxide |
| CO ₂ | Carbon Dioxide |
| DCC | District Coordination Committee |
| DHM | Department of Hydrology and Meteorology |
| DFO | Division Forest Office |
| EA | Executing Agency |
| EIA | Environmental Impact Assessment |
| EMP | Environmental Management Plan |
| EPR | Environment Protection Rules |
| GESU | Geo-Environment and Social Unit |
| HH | Household |
| IEE | Initial Environmental Examination |
| IUCN | International Union for Conservation of Nature |
| LEP | Labor based, Environmentally Friendly and Participatory |
| LPG | Liquefied Petroleum Gas |
| MoFE | Ministry of Forest and Environment |
| NAAQS | National Ambient Air Quality Standard |
| NGO | Non-Governmental Organization |
| NO _x | Nitrogen Oxide |
| OD | Origin-Destination |
| RCIP | Rural Connectivity Improvement Project |
| RoW | Right of Way |
| RM | Rural Municipality |
| SEMP | Site specific Environmental Management Plan |
| SRN | Strategic Road Network |
| TSP | Total Suspended Particle |
| VAT | Value Added Tax |

Project Coordination Unit
Rural Connectivity Improvement Project
Lubughat, Ramechhap District



कार्यकारी सारांश

पृष्ठभूमि

प्रस्तावित लुभुघाट – गाल्पा - दोरम्बा सडक स्तरोन्नति उपआयोजनाले हालको सडकलाई कालोपत्रे सडकमा स्तरोन्नति गर्ने योजना रहेको छ। उक्त सडकको लम्बाई ३३.७५ कि मि रहेको छ। हाल ५ मि. चौडाई रहेको सडक, स्तरोन्नति पश्चात नाली बाहेक कुल ७ मि. को हुनेछ जसमा ५.५ मि गाडी गुड्ने भाग, १.५ मि शोलदर (Shoulder) रहने छ। प्रस्तावित सडकको स्तरोन्नति कार्य पश्चात स्थानीय जनसमुदायमा यातायातको सहज पहुँच हुनेछ। यस सडक सुनापति गाउँपालिका, खाँडादेवी गाउँपालिका र दोरम्बा शैलुंग गाउँपालिकामा पर्दछ। यस सडकमा पर्ने मुख्य बस्तीहरु बोशा, जुकेपानी, दहु, बेथान, साधि बजार, साम्लुंग डाँडा, लातापानी, गाल्पा, दोरम्बा आदि हुन्। यस आयोजनाको कुल लागत ने रु. १,६१०,१३९,९६० (मू.अ. कर र कन्टिन्जेन्सी सहित) रहेको छ।

प्रस्तावक

प्रस्तावित उपआयोजनाको प्रस्तावक नेपाल सरकार, सङ्घीय मामिला तथा सामान्य प्रशासन मन्त्रालय, स्थानीय पूर्वाधार विभाग (डोली), ग्रामिण सडक संजाल सुधार आयोजना (RCIP) रहेको छ।

प्रारम्भिक वातावरणीय परीक्षण अध्ययनको औचित्यता

वातावरण संरक्षण नियमावली २०७७ (संशोधन २०७८), अनुसूची २ (ड) (घ), सडक क्षेत्र सम्बन्धित नियम अनुसार, यदि सडकको लम्बाई १० देखि ५० किमी सम्म भएमा प्रारम्भिक वातावरणीय परीक्षण गर्नु पर्ने हुन्छ। प्रस्तावित सडकको लम्बाई ३३.७५ किमी रहेकोले प्रारम्भिक वातावरणीय परीक्षण प्रतिवेदन तयार गरी सम्बन्धित मन्त्रालय (यस सडकको हकमा सङ्घीय मामिला तथा सामान्य प्रशासन मन्त्रालय) बाट स्वीकृत हुनु पर्दछ।

वातावरण संरक्षण नियमावली २०७७ (संशोधन २०७८), नियम ३ को अनुसूची २ (क) (१२) अनुसार वनको क्षेत्र १ देखि ५ हेक्टरसम्म प्रयोग गर्नु परेमा प्रारम्भिक वातावरणीय परीक्षण गर्नु पर्ने हुन्छ। प्रस्तावित सडक स्तरोन्नतिको लागि ०.९५ हेक्टर थप वनको जग्गा (राष्ट्रिय वन – ०.९१ हे र निजी – ०.०४ हे) अधिग्रहण गर्नु पर्ने देखिन्छ। त्यसैले यस आयोजनाको प्रारम्भिक वातावरणीय परीक्षण अध्ययन गर्नु पर्ने हुन्छ।

वातावरण संरक्षण नियमावली २०७७, नियम ७ (घ) बमोजिम यस आयोजनाको विस्तृत अध्ययन प्रतिवेदन एसियाली बिकास बैंकको आर्थिक सहयोगमा तयार गरिएकोले यस प्रतिवेदनलाई अंग्रेजी माध्यममा तयार गरिएको हो।

प्रस्तावित सडक राष्ट्रिय निकुञ्ज, वन्यजन्तु आरक्ष, सिकार आरक्ष वा अन्य संरक्षण क्षेत्र र तिनका मध्यवर्ती क्षेत्र भएर रेखाङ्कन गरिएको छैन।

एसियाली बिकास बैंकको सुरक्षण नीति (Safeguard Policy Statement, SPS) २००९ अनुसार RCIP लाई “बी श्रेणी” मा वर्गिकरण गरिएको छ। यस नीति अनुसार “बी श्रेणी” मा राखिएका आयोजनाहरुको ‘प्रारम्भिक वातावरणीय परीक्षण’ तहको अध्ययन गर्नुपर्ने हुन्छ।



यस IEE प्रतिवेदनलाई संघीय मामिला तथा सामान्य प्रशासन मन्त्रालयको सचिवस्तरीय निर्णयबाट मिति २०७८-०८-१३ मा IEE अध्ययनका लागि स्वीकृत कार्यसूची (Terms of Reference) अनुसार तयार गरिएको हो ।

आयोजनाको सान्दर्भिकता

हाल सडकको अवस्था ग्राभेल भएको र सडकको चौडाई ३ मि देखि ५.५ मि सम्म मात्र छ र पखाल र नालीको अवस्था पनि कमजोर रहेको छ । त्यसैले सडकको स्तरोन्नति गर्दा सडक फराकिलो पार्ने, design standard अनुसार सडकको चढाई (Longitudinal gradient) सुधारने, पर्याप्त सडक नालीको व्यवस्था गर्ने, नालीको उपयुक्त निकासको व्यवस्था गर्ने तथा सडकलाई कालोपत्र गर्ने जस्ता मुख्य कार्य गर्नु पर्ने देखिन्छ । यसबाहेक, विद्यमान सडकको बढ्दो ट्राफिकलाई सम्बोधन गर्न प्रस्तावित सडकको स्तरोन्नति आवश्यक छ । प्रस्तावित सडकको स्तरोन्नतिले उपआयोजना क्षेत्रको यातायातको पहुँचमा सुधार गर्नुका साथै विभिन्न सेवामा सहज पहुँच पुऱ्याउने र अन्य पूर्वाधारको विकासले उपआयोजना क्षेत्रको समग्र आर्थिक विकासमा टेवा पुग्ने देखिन्छ । सडकले सुनापति गाउँपालिका, खाँडादेवी गाउँपालिका र दोरम्बा शैलुंग गाउँपालिकाका ग्रामीण क्षेत्रलाई मध्य पहाडी लोकमार्ग तथा बि पी राजमार्गसम्मको यातायात सहज बनाउनेछ ।

प्रारम्भिक वातावरणीय परीक्षण अध्ययनको उद्देश्य

प्रारम्भिक वातावरणीय परीक्षण अध्ययनको मुख्य उद्देश्य प्रस्तावित सडक निर्माण तथा संचालनबाट उक्त क्षेत्रको भौतिक, जैविक, सामाजिक, आर्थिक तथा साँस्कृतिक वातावरणमा पर्ने सक्ने प्रभावहरु पहिचान गरी नकारात्मक प्रभावको न्यूनीकरण र सकारात्मक प्रभाव बढाउने उपायहरु बारे सुझाव दिनु, वातावरणीय अनुगमन योजना बनाई कार्यान्वयन गराउनु तथा प्रस्तावित सडक योजनाको लागि प्रारम्भिक वातावरणीय परीक्षण पर्याप्त हुन्छ भन्ने विषयको यकिन गर्नु हो ।

अध्ययन प्रक्रिया

यस अध्ययनमा फिल्ड सर्वेक्षणबाट लिइएका तथ्यांक तथा अन्य उपलब्ध तथ्यांकहरुका साथै सामाजिक तथा प्राविधिक टोलीबाट घरधुरि सर्वेक्षणबाट संकलन गरिएका तथ्यांकहरु केलाएर प्रारम्भिक वातावरणीय परीक्षण प्रतिवेदन तयार गरी निष्कर्ष तथा सुझावहरु दिइएका छन् । अध्ययनका क्रममा स्थानीय जनता, नेता, सामुदायिक वनका उपभोक्ता, पालिका सदस्य, शिक्षक तथा अन्य सरोकारवालासँग छलफल तथा परामर्श गरियो । यसका साथै स्थानीय जनता तथा सरोकारवालाहरुको उपस्थितिमा सार्वजनिक सुनुवाई कार्यक्रम पनि गरियो । उपआयोजनाका कारण प्रभावित स्थानीय तहका कार्यालय, स्वास्थ्य चौकी, शैक्षिक संस्था आदिमा वातावरण संरक्षण नियमावली २०७७, अनुसूची ९ र मुचुल्का बमोजिमको ढाँचामा ७ दिने सार्वजनिक सूचना जारी गरिएको थियो । त्यसपछि स्थानीय पत्रिकामा पनि सूचना प्रकाशन गरिएको थियो । मन्थलीबाट प्रकाशित “पालिका आवाज” साप्ताहिक पत्रिकामा २०७८ फाल्गुन १६ गते सार्वजनिक सुनुवाईको सूचना प्रकाशन गरिएको थियो । २०७८ फाल्गुन २६ गते दोरम्बा शैलुंग गाउँपालिकाको वडा नम्बर २ को कार्यालय र २०७८ फाल्गुन २७ गते सुनापति गाउँपालिकाको कार्यालयमा सार्वजनिक सुनुवाईको आयोजना गरिएको थियो ।

योजना क्षेत्रको विद्यमान वातावरणीय अवस्था

प्रस्तावित सडक लेसर हिमालयन क्षेत्रमा पर्दछ र समुद्री सतहदेखि १०९६ मि देखि २२९६ मि सम्म फैलिएको छ । यो सडक विशेष गरी मानव बस्ती, कृषिजन्य भूमि र वन जङ्गल भएर जान्छ । हावापानीका हिसाबले यो क्षेत्र Sub-Tropical क्षेत्रमा पर्दछ । रामेछाप जिल्लाको औसत अधिकतम र न्युनतम तापक्रम क्रमसः ३३° से र ६° से रहेको छ र औसत वार्षिक वर्षा २७०३ मि. मि. रहेको छ । (स्रोत: रामेछाप जिल्ला प्रोफाइल २०७५)

यसबाहेक यो क्षेत्रमा पाइने अन्य रुखहरुमा सल्लो (*Pinus wallichiana*), उत्तिस (*Alnus nepalensis*) and चिलाउन (*Schima wallichii*) हुन् । यहाँ पाइने अन्य प्रजातिहरुमा पैयु (*Prunus sarasoides*), लाकुरी (*Fraxinus floribunda*), कुटमिरो (*Litsea polyantha*), कटुस (*Castanopsis indica*), खिरा (*Falconeria insignis*), मालगेडी (*Cinnamomum glaucescens*), etc. आदि पर्दछन् ।

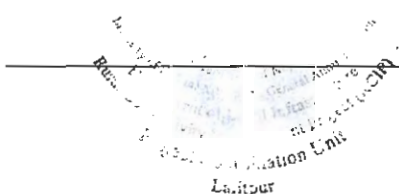
स्थानीय बासिन्दाका अनुसार यस क्षेत्रमा जंगली जनावरहरुको उपस्थिति र तिनिहरुको विचरण न्यून रहेको छ । यस क्षेत्रमा पाइने वन्य जन्तुहरुमा चरी बाघ (*Felis bengalensis*), जंगली बिरालो (*Felis chaus*), बाँदर (*Macaca mulatta*), लंगुर (*Semnopithecus hector*), बँदेल (*Sus scrofa*), खरायो (*Lepus nigricollis*), स्याल (*Canis aureus*), दुम्सी (*Hystrix indica*), मृग (*Muntiacus vjginalis*) आदि हुन् । यस्तै गरी यस क्षेत्रमा पाइने चरा चुरुङ्गीहरुमा कालिज (*Lophura leucomelana*), ढुकुर (*Streptopelia chinensis*), भंगेरा (*Passer domesticus*), दान्ने (*Acridotheres tristis*), काग (*Crovis splendens*), कोइली (*Eudynamys scolopaceus*), चिल (*Milvus migrans*), सारौँ (*Sturnus spp.*) आदि हुन् ।

यस उपआयोजना क्षेत्रका पालिकाहरु (सुनापति गाउँपालिका, खाँडादेवी गाउँपालिका र दोरम्बा सैलुङ्ग गाउँपालिका) मा कुल १४,८९७ घरधुरी रहेका छन् । जसमा कुल जनसंख्या ६८,८५४ (पुरुष ३१,४४८ र महिला ३७,४०६) रहेका छन् । यस क्षेत्रमा बसोबास गर्ने मुख्य जातजातिहरुमा तामाङ (२९.८४%), नेवार (१९.२३%), क्षेत्री (१७.८६%) र मगर (१४.२१%) पर्दछन् । त्यसैगरी, यहाँ बोलिने मुख्य भाषा नेपाली (५२.८२%) हो । यहाँ बोलिने अन्य भाषाहरु नेवारी (९.६८%), थामी (३.१०%), मगर (२.८०%) र अन्य (३.२९%) हुन् । सोनाम ल्होसार, दसैँ, तिहार र माघी यहाँको मुख्य पर्वहरु हुन् ।

यस क्षेत्रमा खानेपानीको मुख्य श्रोतहरु धारा (७४.४१%) र कुवा (७.१२%) हुन् । सरसफाईको हकमा ४९.९९% घरमा शौचालय उपलब्ध छैन, ३२.३१% घरमा फ्लश शौचालय छ भने १६.८१% घरमा सामान्य शौचालय छ ।

प्रारम्भिक वातावरणीय अध्ययनका क्रममा आयोजनाको प्रत्यक्ष प्रभावित क्षेत्रमा गरिएको घरधुरी सर्वेक्षणले १८०४ घरधुरी रहेको देखाउँछ । करिब १०% (१७९) छानिएको घरधुरीको सामाजिक सर्वेक्षणले प्रत्यक्ष प्रभावित क्षेत्रको मुख्य धर्म हिन्दु (५१.०४%) देखाउँछ र प्रमुख भाषा तामाङ्ग (४९.७२%) रहेको छ । यस क्षेत्रका २४.०६% बासिन्दा निरक्षर छन् भने बाँकी साक्षर छन् । हाल ९०.५०% घरधुरीमा पक्कै शौचालय र ९.५०% घरधुरीमा कच्ची शौचालय रहेको छ । २१.७९% घरमा खानेपानीको लागि आफ्नै निजि धारा रहेको छ ।

यस आयोजना क्षेत्रका बासिन्दाहरुको मुख्य पेशा कृषि र पशु पालन हो । यद्यपी पहाडी भू-वनोट र यातायातको असुविधाले कृषि कार्य सहज भने छैन ।



सकारात्मक प्रभावहरु

सडक स्तरोन्नति पछि यातायातको सुविधाले स्थानीय बासिन्दाहरुको जीवनमा थुप्रै सकारात्मक प्रभाव पर्नेछ । सडक स्तरोन्नति निर्माण कार्य हुँदा स्थानीय बासिन्दाहरुले श्रमिकको रुपमा (करिब २२९,३२४ अदक्ष श्रमिकले र ७३,३२३ दक्ष श्रमिकले) रोजगारीका अवसरहरु र प्राविधिक सीप तथा ज्ञान समेत प्राप्त गर्ने छन् । साथै साना व्यवसायबाट पनि आर्थिक उपार्जनको अवसरहरु प्राप्त हुनेछ ।

यस सडक स्तरोन्नति पश्चात ग्रामिण भेगबाट बजार क्षेत्र र बजार क्षेत्रबाट ग्रामिण भेगमा सेवा तथा सामानहरुको ओसार पसार छिटो, छरितो, सुलभ तथा सस्तो हुन जानेछ । बजारको सहज पहुँचले कृषकहरुलाई कृषि उत्पादन बढाउन उत्साहित गर्नेछ । यसले गर्दा उत्पादकत्वमा वृद्धि भई अन्ततोगत्वा ग्रामिण भेगका बासिन्दाको आर्थिक स्तरमा सुधार हुनेछ । सहज पहुँचका कारण पर्यटकको आवगमन बढ्न गइ आर्थिक क्रियाकलाप बढ्न जानेछ जसका कारण ग्रामिण बासिन्दाको जीवनस्तर उकासिनेछ । सडक सञ्जालको बिकासले बजार क्षेत्रको विकास भइ जग्गाको मुल्यमा समेत वृद्धि हुन जानेछ । सडक स्तरोन्नति पश्चात इन्धन खपत न्यून हुने तथा पार्ट पुर्जा कम खिच्ने हुनाले यातायात संचालन खर्च कम हुनेछ । त्यसै गरी धुँवा धुलोको समस्या पनि कम भएर स्थानीयको स्वास्थ्यमा पनि अति न्यून मात्र नकारात्मक प्रभाव पर्नेछ ।

नकारात्मक प्रभावहरु

सडकको स्तरोन्नति कार्य गर्दा भौतिक वातावरणमा पर्ने नकारात्मक प्रभावहरुमा भू-उपयोगमा बदलाव, भिरालो जग्गामा पहिरो जाने, वायु तथा पानीमा प्रदुषण, खनेको माटो फालिदा पर्ने प्रभावहरु मुख्य छन् । सडक निर्माणको क्रममा उत्खननका कारण ५७५,७६७.३४ घन मिटर अनावश्यक माटो जम्मा हुन्छ । माटोको अव्यवस्थित व्यवस्थापनले प्राकृतिक पानीका प्राकृतिक निकास अवरुद्ध हुने, उर्वर माटो, खेतबारी, बाली तथा जङ्गल नष्ट हुने जस्ता समस्या उत्पन्न हुन सक्छ । यस्तै गरी जैविक प्रभाव अन्तर्गत ०.९१ हेक्टर सामुदायिक वन क्षेत्र (सुनापति सल्लेनी सामुदायिक वन, सुनापति सर्वभांग किपुङग सामुदायिक वन, फलाम पोखरी सामुदायिक वन, चन्द्रमुखी सामुदायिक वन, सूर्यमुखी सामुदायिक वन, गैरीडाँडा सामुदायिक वन, रात माटे सामुदायिक वन, गोठे डाँडा करयांग मरयांग सामुदायिक वन, भोप्लिंग खोला कबुलियत वन, भुमिथान सामुदायिक वन र अन्य निजी वन) जस अन्तर्गत ४५१ रुखहरु काट्नु पर्ने हुन्छ । यसले न्यजन्तु र चरा चुरुङ्गीको बासस्थानमा बाधा पुग्नेछ । सडक निर्माणको क्रियाकलापबाट जीवजन्तुलाई असर पर्न सक्छ । साथै, सडक निर्माण कार्यमा खटिएका कामदारहरुले स्थानीय वनका जीवजन्तुलाई जिस्काउने तथा तिनको शिकार गर्न सक्ने सम्भावना रहन्छ । तथापि यस्ता प्रभावहरु न्यून हुनेछन् ।

सामुदायिक सहभागिता योजना (CPP) टोलीले सडक चौडाईको स्तरोन्नति गर्दा क्षति हुने जग्गा वा सम्पत्तिको सामाजिक आर्थिक सर्वेक्षण गरेको थियो । उपआयोजनाबाट प्रभावित जग्गा प्लटहरुको कुल संख्या ७५० (प्रमाणित भूखण्डहरु - ५०९ प्लटहरु (होलिडिङ - ३६१ घरधुरी र अप्रमाणित भूखण्डहरु - २४१ प्लटहरु) पाइएका छन् । प्रमाणित प्लटहरु / अप्रमाणित प्लटहरुबाट प्राप्त गर्नुपर्ने जग्गा क्रमशः ७.९३ हे र ४.६३ हे रहेका छन् । क्षेत्र सर्वेक्षणले गम्भीर रूपमा प्रभावित हुने घरधुरीको पहिचान भएन किनभने सबै घरधुरीसँग एक भन्दा बढी जग्गा जमिन छन् । उपआयोजनाबाट प्रभावित निजी संरचनाको संख्या २५ (आवासीय घरहरु - २५ वटा र टहराहरु - ५ वटा) पाइएका छन् । सडक स्तरोन्नति कार्यको सिलसिलामा ११२ वटा बिजुलीको खम्बा र ३ वटा खानेपानीको टंकीमा प्रभाव पर्ने देखिन्छ ।

सकारात्मक प्रभाव बढोत्तरी तथा नकारात्मक प्रभाव न्यूनीकरणका उपायहरू

यस सडक स्तरोन्नति कार्यवाट सकारात्मक तथा नकारात्मक दुवै प्रकारका प्रभावहरू पर्ने देखिन्छन् । सकारात्मक प्रभाव बढाउने उपायहरू तथा नकारात्मक प्रभाव न्यूनीकरण गर्ने उपायहरूको प्रभावकारी कार्यान्वयनले गर्दा सकारात्मक प्रभाव बढ्नुका साथै नकारात्मक प्रभाव न्यून गर्न सकिने वा हटाउन सकिने छन् । प्रभावहरूको आंकलनको आधारमा सडक निर्माण तथा संचालन दुवै चरणमा सकारात्मक प्रभाव बढ्ने उपाय र नकारात्मक प्रभाव हटाउने उपायहरू उल्लेख गरिएका छन् । आयोजनाले जलवायू परिवर्तनवाट हुने सम्भावित प्रभावहरूलाई पनि यसको डिजाईनमा सम्बोधन गरिएको छ ।

सकारात्मक प्रभाव बढोत्तरीका उपायहरू

सडक निर्माणका क्रममा महिला, गरिब र बिपन्न वर्गको अत्याधिक सहभागितामा जोड दिइने छ । कामदार तथा प्रभावित क्षेत्रका बासिन्दाहरूको जीविकोपार्जन सुधार गर्नको लागि विभिन्न सीपमूलक (आय आर्जन, डकमी तालिम, इन्जिनियरिङ्ग संरचनाको निर्माण तथा जैविक प्रविधि तथा वृक्षारोपणका कामहरू सम्बन्धि) तालिमहरू दिइने छ ।

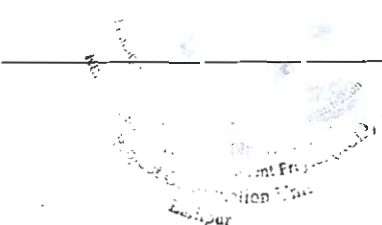
नकारात्मक प्रभाव न्यूनीकरणका उपायहरू

श्रममा आधारित, वातावरण मैत्री तथा सहभागिता मुलक अवधारणा अवलम्बन गरी वातावरणमा पर्ने प्रभावहरूको न्यूनीकरण गरिने छ । जस अनुरूप, खन्ने र पुर्ने माटोको आयतनमा सन्तुलन मिलाउनुका साथै खनिएका बस्तुहरूको पुनर्प्रयोग तथा जैविक प्रविधि (वायो इन्जिनियरिङ्गको प्रयोग गरिने छ । भिरालो जग्गाको व्यवस्थापनको लागि पर्याप्त प्रावधानहरू सडक योजनाको डिजाईनमा राखिएका छन् । खानी सञ्चालन (Quarries Operation) अस्थिर (कमजोर) क्षेत्रहरू, भूक्षय हुने क्षेत्रहरू, वन, बस्तीहरू तथा उर्वर जमिनमा गरिने छैन र वर्षे पानीको व्यवस्थापन गरी रोकथाम गरिने छ ।

वनजङ्गलको क्षतिग्रस्त क्षेत्रलाई सम्बोधन गर्न स्थानीय स्तरमा वृक्षारोपण गर्न प्रोत्साहन गराइनेछ । प्रभावित रुखहरूलाई क्षतिपूर्ति गर्नको निमित्त सामुदायिक वनमा ४५१० वटा रुख बिरुवाहरू वृक्षारोपण गरिनेछ तथा त्यसको संरक्षण गर्नका निमित्त ५ वर्षको समयावधिको लागि अनुमानित ने.रु. ८,९८७,७५७- “राष्ट्रिय प्राथमिकता प्राप्त योजनाको लागि राष्ट्रिय वन क्षेत्र प्रयोग सम्बन्धी मापदण्ड सहितको कार्यविधि, २०७६” दफा १७ उपदफा ८ बमोजिम वन बिकाश कोशलाई प्रदान गरिनेछ । वन्यजन्तु र चरा चुरुङ्गीहरूलाई कम मात्रामा अवरोध होस भन्ने हेतुले वनको छेउछाउमा निर्माण कार्य गर्दा ब्यबस्थित तरिकाले गरिनेछ । सडक स्तरोन्नतिका कारणले हुने वन क्षेत्रको क्षतिको सट्टाभर्ना स्वरूप उपलब्ध गराउनु पर्ने जग्गा बापतको लागत सोहि कार्यविधिको दफा १३ अनुसार ०.९५ हेक्टर क्षेत्रको लागत ने. रु. १,५१८,६९४ को अनुमान गरिएको छ र उक्त रकम पनि वन बिकाश कोशमा जम्मा गरिनेछ ।

हाल कार्यान्वयन भइरहेका RCIP अन्तर्गतका आयोजनामा वनको जग्गा प्रयोग सम्बन्धी मन्त्री स्तरिय निर्णय २०७७/७८ अनुसार सट्टाभर्ना बापतको जग्गामा १६०० बिरुवा प्रति हेक्टरका दरले १५२० बिरुवाहरू रोप्न र ५ वर्षसम्म संरक्षण गर्नका निमित्त रु. ३,०२९,१३३ लागत अनुमान गरिएको र उक्त रकम डिभिजन वन कार्यालयलाई प्रदान गरिने छ ।

उपआयोजनावाट अधिग्रहण गर्नु पर्ने जमिनको हकमा जग्गाधनी (सडक लाभग्राहि)हरूवाट स्वेच्छिक जग्गा दानको अवधारणा अनुरूप अधिग्रहण गरिने छ । आयोजनावाट प्रभावित नीजि संरचनाको हकमा आयोजनावाट क्षतिपूर्तिको व्यवस्था गरिएको छ । अधिग्रहण गर्नु पर्ने जमिन र प्रभावित नीजि संरचनाका क्षतिपूर्तिका विषय संवोधन गर्न आयोजनाको निमित्त भिन्दै तयार गरिने सामुदायिक सहभागिता योजना (



CPP) मार्फत गरिने छ । सडक स्तरोन्नति कार्यको सिलसिलामा ३ वटा खानेपानीको टंकी पुनर्निर्माण गरिनेछ । यसका साथसाथै ११२ वटा बिजुलीका खम्बा स्थानान्तरण गरिनेछ ।

सडक सञ्चालनको अवस्थामा साना पहिरो तथा माटो खसेका ढिस्काहरुलाई तत्काल उचित प्रविधिबाट सफा गरिनेछ । सवारी साधनको उत्सर्जन तथा सवारीको गतिलाई व्यवस्थापन गरिनेछ । सवारी चालकहरुलाई सचेत गराउन वन, विद्यालय र आवास क्षेत्र तथा वन्यजन्तु हिड्डुल गर्ने सम्भावित क्षेत्रहरुमा हर्न बजाउन निषेध गरिएका साइनबोर्डहरु राखिने छन् । साथै सम्भावित दुर्घटनाबाट जोगाउन उपयुक्त सडक सुरक्षाका उपायहरु अवलम्बन गरिनेछ ।

वातावरणीय अनुगमन तथा व्यवस्थापन योजना

यस प्रतिवेदनमा वातावरणीय व्यवस्थापन योजना अन्तर्गत उपआयोजनाबाट पर्ने सम्भावित असरहरु, असरहरुको प्रभाव, न्यूनीकरण विधि, अनुगमन विधि तथा कार्यतालिका प्रस्तावित गरिएका छन् । यसका साथै न्यूनीकरणका उपायहरुको तथा अनुगमन कार्यको कार्यान्वयन गर्ने जिम्मेवार निकायहरुको पनि पहिचान गरिएको छ । अनुगमनका लागि आवश्यक भौतिक, सामाजिक (आर्थिक तथा साँस्कृतिक वातावरणका विभिन्न अनुगमन सुचकाङ्कहरुको पनि पहिचान गरिएको छ । यस स्तरोन्नति आयोजनाको वातावरणीय अनुगमन तथा व्यवस्थापन योजनाका लागि उपआयोजनाबाट करिब ने.रु. ५९,२४०,९२० अनुमानित लागत रकमको व्यवस्था गरिएको छ ।

निष्कर्ष

प्रस्तावित सडक खण्डको स्तरोन्नति कार्यको प्रारम्भिक वातावरणीय परीक्षण प्रतिवेदनले नकारात्मक प्रभावको तुलनामा सकारात्मक प्रभावहरु वढी महत्वपूर्ण र दीर्घकालीन हुने देखिन्छ । साथै, नकारात्मक प्रभावहरु स्थानीय र निर्माण अबधी भित्रै सिमित हुने प्रकृतिको रहेकाले न्यूनीकरण गर्न सकिने पनि देखिन्छ । यस प्रतिवेदनमा प्रस्ताव गरिएका वातावरण अनुगमन तथा व्यवस्थापन योजना उपयुक्त समयमा कार्यान्वयन गरे वातावरणीय तथा सामाजिक सवाल सम्बोधन गर्न पर्याप्त छन् । यो सडक आयोजनाको स्वीकृतिको लागि प्रारम्भिक वातावरणीय परीक्षण पर्याप्त रहेको छ ।

EXECUTIVE SUMMARY

The proposed Lubughat – Galpa - Doramba Road, road upgrading is intended to upgrade the existing track to blacktop road. The road section is 33.75 km long. The existing width of the road is about 5 m and will be upgraded up to 7 m total width including 5.5m carriageway, 1.5 m shoulder and excluding drain. The proposed road upgradation work will help to facilitate the transport service to the local people. The road alignment passes through Khandadevi Rural Municipality, Sunapati Rural Municipality and Doramba Rural Municipality. The major settlements along the alignment are Bosha, Jukepani, Dahu, Bethan, Sadhi Bazar, Samlung Dada, Latapani, Galpa, Doramba, etc. The total cost of the subproject is estimated at about NRs. 1,610,139,960 (Including Contingencies and VAT).

Proponent

The proponent of the proposed road upgrading is Government of Nepal, Ministry of Federal Affairs and General Administration, Department of Local Infrastructure, (DOLI), Rural Road Connectivity Improvement Project (RCIP).

Rationality of the IEE Study

As per EPR 2077 (Amendment 2078), schedule 2 (Nga) Road Sector pertaining to rule 8, Initial Environmental Examination (IEE) is required for upgrading roads of length greater than 10 km and up to 50 km. As the proposed road is 33.75 km long, preparation of IEE report and approval from concerned ministry (MoFAGA in this case) is required.

Schedule 2 (Ka) (12) of EPR, 2077 (amendment 2078), IEE is required for acquiring (1–5) ha forest land. The proposed road requires additional forest land of 0.95 ha (government land – 0.91 ha and private forest – 0.04 ha). So, IEE study is mandatory for implementation of the road upgrading works.

As per EPR 2077, Rule 7(8), the DPR has been prepared with the financial assistance of ADB, therefore the report has been prepared in English.

The proposed road alignment does not pass through any National Parks, Wildlife Reserves, Hunting Reserves or any other protected areas and their buffer zone.

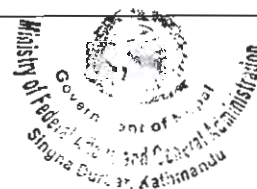
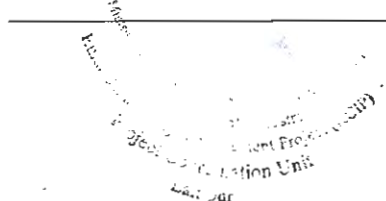
RCIP is categorized as category “B” project according to ADB Safeguard Policy Statement (SPS), 2009. A Category “B” Project has to undertake an IEE level of Study according to the policy statement.

This IEE has been prepared as per the approved Terms of Reference (approved date - 2078/08/13) for IEE Study through secretary level decision by Ministry of Federal Affairs and General Administration.

Relevancy of the Subproject

The existing earthen/gravelled road is narrow with width that varies from 3 m to 5.5 m and has poor retaining and drainage structures. Hence, widening, improvement of grade to design standard, provision of side drains with adequate and appropriate cross drainage structures and upgrading the road surface to appropriate pavement are major intervention required.

Further, upgrading of the proposed road is essential to address the increasing traffic on the existing road. Along with improving the accessibility of the subproject area, upgrading of the



proposed road will provide easy access to different services and development of other infrastructures leading to overall economic development of subproject area. The road connects rural areas of Khandadevi Rural Municipality, Sunapati Rural Municipality and Doramba Sailing Rural Municipality with Mid-Hill Highway and subsequently BP Highway at Nepalthok.

Objectives of the IEE Study

The main objective of this IEE Study is to identify the impacts of proposed road construction and operation on physical, biological, socio-economic and cultural environment of the subproject area and propose enhancement and mitigation measures to augment beneficial impacts avoid or mitigate adverse impacts, prepare and implement environmental monitoring plan for the subproject and make sure that IEE is sufficient or not for the proposed road subproject.

Study Methodology

The findings and conclusions of the report are based on the analysis of the information collected from the field by undertaking a walkover environmental survey along the proposed alignment and secondary information is supplemented by data collected by the social and technical team. Public consultation was carried out with the local people, local leaders, CFUGs, members of Rural Municipalities, teachers and other concerned stakeholders. Public Hearing was also carried out and suggestions and feedback from concerned stakeholders including local affected people were collected. A 7-day public notice was posted in offices of local level affected due to the subproject, health posts, educational organizations, etc. in the format provided in EPR Schedule 9 and deed of inquiry (Muchulkas) was obtained. After this, the similar notice was published on local/national newspaper. A public hearing notice was published on 16th Falgun 2078 in "Palika Awaaz" weekly newspaper published from Manthali. Public hearings were organized in ward no 2 of Doramba Rural Municipality (RM) on Falgun 26, 2078 office of Sunapati RM on Falgun 27, 2078.

Existing Environmental Condition

Physiographically, the proposed road section lies in Lesser – Himalaya Zone and lies between an altitude of 1096m to 2296m amsl. The road alignment passes through settlement, agricultural land and forest area. Climatologically, the subproject area lies in sub-tropical region. The average maximum and minimum temperature of Ramechhap district is 33°C and 6°C respectively and average annual rainfall in the district is 2,703 mm. (Source: District Profile of Ramechhap-2075).

The dominant tree species reported within the subproject area and road alignment are Salla (*Pinus wallichiana*), Uttis (*Alnus nepalensis*) and Chilaune (*Schima wallichii*). The other tree species are Paiyu (*Prunus sarasoides*), Lakuri (*Fraxinus floribunda*), Kutmiro (*Litsea polyantha*), Katus (*Castanopsis indica*), Khirra (*Falconeria insignis*), Malgedi (*Cinnamomum glaucescens*), etc.

According to locals, the presence of wild animals and their movement in this area is low. The wildlife found within the subproject area are Chari Bagh (*Felis bengalensis*), Jungle cat (*Felis chaus*), Monkey (*Macaca mulatta*), Langur (*Semnopithecus hector*), Bandel (*Sus scrofa*), Hare (*Lepus nigricollis*), Jackal (*Canis aureus*), Dumsi (*Hystrix indica*), Mriga (*Muntiacus vaginalis*) etc. Similarly, the bird that are found in the subproject area are Kalij (*Lophura leucomesana*), Dhukur (*Streptopelia chinensis*), Bhangera (*Passer domesticus*),

Dangre (*Acridotheres tristis*), Crow (*Crovis splendens*), Koili (*Eudynamys scolopaceus*), Kite (*Milvus migrans*), Sarau (*Sturnus spp.*) etc.

The total number of households in the subproject palika (Sunapati Rural Municipality, Khandadevi Rural Municipality and Doramba Sailung Rural Municipality) is 14,897 with total population of 68,854 (Male 31,448 and Female 37,406). The major ethnic groups are Tamang (29.84%) followed by Newar (19.23%), Chhetree (17.86%) and Magar (14.21%). The dominant language spoken in the subproject palikas is Nepali with 52.82%. Other languages are Newar (9.68%), Thami (3.10%), Magar (2.80%) and other languages (3.29%). Sonam Lhosar, Dashain, Tihar and Maghe are the major festival celebrated by these groups.

The major source of drinking water is tap water (74.41%) and well/kuwa (7.12%). Regarding the sanitation facility, 49.99% of the households have no toilet, 32.31% have flush toilet and 16.81% have ordinary toilet.

Household survey in the Project Area was conducted for the inventory of socio-economic and cultural data. From the drone imagery, 1804 houses were observed along the road alignment (125 m on either side from centre of the road) and around 10% of 1804 were taken as sample houses (i.e., 179 houses) for social survey. The major religion found in the DIZ are Hinduism (51.04%) with major language Tamang (49.72%). 24.06% of the people are illiterate and rest are literate. 90.50% have access to the Permanent toilet and only 9.50% have temporary toilet. 21.79% of the Household have their personal tap for drinking water. The main occupation of the people of the DIZ is agriculture and livestock.

Beneficial Impacts

Road upgrading work will have multi-fold beneficial impacts on livelihood of the locals. Road upgrading work will generate employment opportunity to local people based on their qualifications and skills as construction labour (about 229,324 unskilled and 73,323 skilled man-days) and gain technical knowledge and skills.

During operation phase of road, transportation of good and services to and from subproject area as well as neighbouring areas to the market area will become faster, easier and cheaper. Farmers will be encouraged to enhance agriculture production because of improved access to market. Agricultural production will increase and will ensure better economic condition of the people living in the rural area. Flow of visitors due to road upgrading will contribute in the enhancement of economic activities of the area which will increase the living condition of the local people. The better road network will result in increased land price due to development of market areas. The upgrading of the road will reduce running costs of vehicles due to reduction in fuel consumption, reduction in wear and tear of vehicle parts etc. Due to the improvement in road condition, there will be reduction in dust and gas emission resulting in less health impact on the people of subproject area.

Adverse Impacts

During the road construction, some of the adverse impacts on physical environment include change in land use pattern, landslides in sloping land, air and water pollution and impacts from disposal of soil and earth material. During the road construction, 575,767.34 cum of spoils are generated due to the excavation of the soil. Unmanaged disposal of spoil may cause blockage of natural drainage systems, loss of organic fertile top soil and farmlands, crops, forest and water logging. The biological impacts during upgrading works will be loss

of 0.91 hectares (ha) of forest area for formation width, loss of 451 trees from forests (Sunapati Salleni Community Forest, Sunapati Sarvajhang Kiprug Community Forest, Phalam Pokhari Community Forest, Chandramukhi Community Forest, Suryamukhi Community Forest, Gairi Danda Kabuliyat Forest, Ratmate Community Forest, Gothe Danda Karyangmaryang Community Forest, Jhopsing Khola Kabuliyat Forest, Bhumithan Community Forest and private forest) which will create disturbance to wildlife and bird habitat. Also, during construction of road there might be possible impacts on wildlife as workers might harass/hunt the wildlife in the nearby forests, however, such impacts are very minimum.

Community Participation Plan (CPP) team carried out the socio- economic survey of the affected households whose land or properties lies within the formation width of the road alignment. The total number of affected land plots by the subproject is 750 (verified plots - 509 plots (holding - 361 HHs); unverified is 241 plots). The land that needs to be acquired from verified plots and unverified plots are 7.93 ha and 4.63 ha respectively. The field survey did not identify severely affected HHs as they hold more than one land parcel. The number of affected private structure by the subproject is 25 (residential houses - 25 nos. and sheds/huts - 5 nos.) Similarly, 112 electric poles and 3 water tanks are affected during widening of the road. A Community Participation Plan (CPP) prepared as a part of project will address the loss of private land and structures in details.

Environmental Enhancement and Mitigation Measures

Impacts from the proposed road upgrading can be both beneficial as well as adverse. An effective implementation of benefit maximization measures and adverse impacts mitigation measures would optimize the benefits expected from the upgrading and avoid/minimize the adverse impact from the upgrading of the road. Based on the impact assessment and identification, beneficial augmentation and adverse impact mitigation measures are presented for both construction phases as well as for operation phase of the road. The subproject has also considered likely impacts of climate change in its design.

Enhancement Measures

During the construction phase more emphasis will be given to women, poor and disadvantaged group workers. Life skill training like, income generation activities, construction of engineering structures and bioengineering works for workers and affected people will be conducted to improve their livelihood.

Adverse Impacts Mitigation Measures

Excess excavated soil or spoils will be safely disposed and managed with minimum environmental damage using Labour based, Environment-friendly and Participatory (LEP) approach which includes balanced cut and fill volume, re-use of excavated materials and minimum quantity of earth works and adoption of bio-engineering techniques. Adequate slope stabilization measures will be provisioned in design for the stabilization of slopes. Unstable sites, erosion prone area, dense forest area, settlements, fertile farm land should be avoided for quarrying operation.

Loss of trees will be compensated by encouraging local people to plant trees in their private land. Likewise, Forest Development Fund will be provided the estimated cost of NRs 8,987,757 for the compensatory plantation of 4510 trees and protection for 5 years as per "Work Procedure with Standards for the Use of National Forest Land for National Priority Project, 2076" Section 17 (8). The construction activities near forest area will be

appropriately managed so that there will be least disturbance to the wildlife and birds. For the forest land lost due to the road upgradation, a compensatory cost of NRs 1,518,694 has been estimated and will be submitted to Forest Development Fund

Similarly, as per the review of Cabinet Decision on use of forest land for RCIP Roads in Ongoing Projects 2077/78 BS, for the afforestation in the compensated land at the rate 1600 sampling per hectare and protection for 5 years, NRs 3,029,133 has been estimated and will be submitted to Division Forest Office as per review of Cabinet on use of forest land for RCIP Roads in Ongoing Projects 2077/78 BS.

For private land that need to be acquired from the land owner, concept of voluntary land donation will be adopted. Regarding the private structure, compensation will be provided to the owner. A community Participation Plan (CPP) prepared as a part of subproject will address the compensation regarding the loss of private land and structures. During road upgrading works compensation or construction will be done for the affected water tanks (3 nos). Also, relocation of 112 electric poles will be done.

During operation stage, minor landslide and mass wasting will be immediately cleared and slope restored with appropriate technology. Vehicle emission standard and speed limit of the vehicles will be maintained. Appropriate traffic sign and signal boards will be erected informing drivers about prohibition of blowing horns in the forest areas, schools, settlements and potential areas for wildlife crossing. Appropriate road safety measures will also be applied in required places adequately.

Environmental Monitoring and Management Plan

The Environmental Management Plan (EMP) delineates key issues likely to arise from implementation of the upgrading, and proposes mitigation measures, including monitoring schedule and responsibility. The EMP also outlines environmental management roles and responsibilities, road design and construction management of different activities, site supervision, monitoring and reporting, records, and corrective measures, improvement proposals, and cost estimates for mitigation measures. The tentative cost for implementation of EMP is estimated at around NRs. 51,240,120.

Conclusion

The IEE study of the proposed road upgrading reveals that the benefits from the implementation of the proposed road upgradation subproject are more significant and long term in nature against the adverse impacts most of which could easily be mitigated or avoided through applying proposed mitigation measures. Most of the impact are local and limited to construction period. Appropriate and timely implementation of EMP and monitoring works suggested in this IEE report is adequate to address the environmental and social issues. Hence this IEE study is sufficient for the proposed road upgrading works.

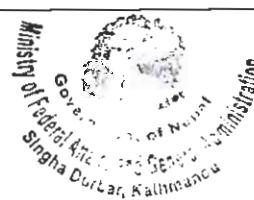
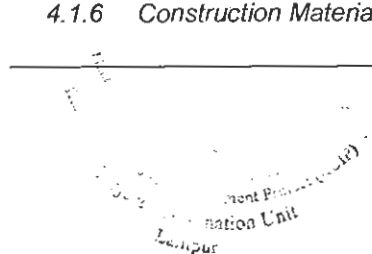


ACRONYMS/ABBREVIATIONS

EXECUTIVE SUMMARY

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Ministry of Federal Affairs and General Administration
Government of Nepal
Department of Local Infrastructure
Rural Connectivity Improvement Project (RCIP)
Project Coordination Unit
Lalitpur



Ministry of Federal Affairs and General Administration
Government of Nepal
Singha Durbar, Kathmandu

1 NAME AND ADDRESS OF THE ORGANIZATION PREPARING THE REPORT

1.1 Name and Address of the Proponent

Rural Connectivity Improvement Project (RCIP) under Department of Local Infrastructure (DoLI) is the implementing agency and proponent for the upgrading of Lubughat - Galpa - Doramba Road including Initial Environmental Examination (IEE). As DoLI/ RCIP is under the Ministry of Federal Affairs and General Administration (MoFAGA) at central level, MoFAGA is the concerned authority for the approval of Terms of Reference (ToR) and IEE Report.

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1.2 Name and Address of the Consultant

The Proponent has awarded Joint Venture of AVIYAAN-SOILTEST-CARD for preparing Detailed Project Report including IEE of the proposed road upgrading.

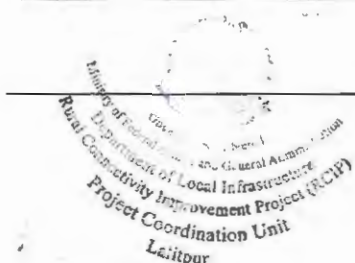
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The IEE study for the upgrading of Lubughat - Galpa - Doramba Road was carried out by a team of qualified professionals within AVIYAAN-SOILTEST-CARD JV which consisted of the followings:

Table 1-1: IEE Study Team

| S N | Position | Name of Member | Qualification | Years of Experience |
|-----|---------------------------|-----------------------|---|---------------------|
| 1 | Environmental Expert (TL) | Dwarika Phuyal | M.Sc. Environment Engineering | 20 |
| 2 | Road Engineer | Er. Sashi Shrestha | M.Sc. in Transport Engineering | 20 |
| 3 | Biological Expert | Mr. Bishow Poudel | M.Sc. In Wildlife Management, biodiversity Conservation and Protected Area Management | 3 |
| 4 | Socio-economic Expert | Mr. Subash C. Ghimire | M.A. in Sociology | 11 |
| 5 | Geotechnical Engineer | Deepak Chhetree | M.Sc. Geotechnical Engineering | 15 |



2 SUMMARY OF THE PROPOSAL

2.1 Background

Rural Connectivity Improvement Project (RCIP) is a follow-on project of Rural Reconstruction and Rehabilitation Sector Development Project (RRRSDP). The project aims in improving connectivity between rural communities, productive agricultural areas and socioeconomic centers in 16 districts namely Panchthar, Ilam, Jhapa, Morang, Sunsari, Dhankuta, Sindhuli, Dolakha, Sindhupalchok, Kavrepalanchowk, Bhaktapur, Kathmandu, Chitwan, Parbat, Rolpa and Rukum of Nepal by improving rural roads and enhancing capacity of road implementation agency. The Project is being implemented with the loan assistance of Asian Development Bank (ADB) and counterpart funding from Government of Nepal (GoN). The total project duration is 5 years (2018 to 2023).

RCIP shall improve the rural road conditions between the selected rural communities, agriculture production areas and enhance capacity of rural infrastructure agency and road users in project areas. The project will also focus on improving institutional arrangements, business processes, and associated capacity building, particularly on road asset management and road safety.

DPR preparation of 2000 km roads for next phase-Follow On project of RCIP (RCIP 2) is one of the project components of RCIP. Under this component, feasibility study of selected roads of approximately 765 Km in Province No 1, 680 Km in Bagmati Province, 595 Km in Gandaki Province, 420 Km in Lumbini Province and 340 km in Karnali province and Preparation of Detail Project Report (DPR) of feasible road of 545 Km in Province No 1, 485 Km in Bagmati Province, 425 Km in Gandaki Province, 300 Km in Lumbini Province and 245 km in Kamali province is to be carried out. The proposed subproject will also play a catalytic role for the sustainable development of rural areas. Lubughat - Galpa - Doramba Road is one of the subprojects among the roads considered for DPR preparation in Bagmati Province.

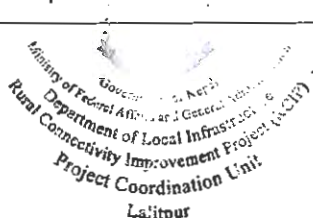
2.2 Objective of the Subproject

The main objective of the subproject is to upgrade 33.75 km. long Lubughat - Galpa - Doramba Road subproject to black top standard. It aims to improve transport efficiency along the alignment that passes through rural wards 2, 3, 4, 5 and 7 of Sunapati Rural Municipality, rural ward 7 of Khandadevi Rural Municipality and ward no. 2 of Doramba Rural Municipality and that will contribute to expansion of economic opportunities and poverty reduction of the area. This will be realized by: improved road network, safe and appropriate road usage and increased efficiency of transport services along different settlements like Rupakot, Bhwasu, Dahu, Bethan, Hilledevi, Dungre, Kama, Galpa, Doramba, etc. Furthermore, the road will assist in connecting rural areas of the rural municipalities with Mid-Hill Highway and subsequently BP Highway which are located either side of Sunkoshi River and connected through steel truss bridge at Nepalthok.

Subproject immediate outcomes will be improved accessibility to social services and markets, increased fuel efficiency, reduced travel time, accidents and vehicle emissions and better employment opportunities outside agriculture, both through improved access to economic centers and increased industrial activities in the subproject districts.

2.3 Relevancy of the Project

At present the road surface is earthen/gravelled. Mostly, the road width varies from 3 m to



5.5 m. Existing retaining structures to address the slope failures and existing drainage structures for efficient drainage of the catchment seems to be inadequate. Hence, widening of narrow width, improvement of grade to design standard, provision of side drains with adequate and appropriate cross drainage structures and upgrading the road surface to appropriate pavement are major intervention required.

Further, upgrading of the proposed road is essential to address the increasing traffic on the existing road. Along with improving the accessibility of the subproject area, upgrading of the proposed road will provide easy access to different services and development of other infrastructures leading to overall economic development of subproject area. The road connects rural areas of Sunapati, Khandadevi and Doramba Rural Municipality with Mid-Hill Road.

2.4 Rationality of the IEE

As per EPR 2077(Amendment 2078), schedule 2 (Nga) Road Sector pertaining to rule 8, IEE is required for upgrading roads of length greater than 10 km and up to 50 km. As the proposed road is 33.75 km long, preparation of IEE report and approval from concerned ministry (MoFAGA in this case) is required.

Schedule 2 (Ka) (12) of EPR, 2077 (amendment 2078), IEE is required for acquiring (1 – 5) ha forest land. The proposed road requires additional forest land of 0.95 ha (government land – 0.91 ha and private forest – 0.04 ha). So, IEE study is mandatory for implementation of the road upgrading works.

As per EPR 2077, Rule 7(8), the DPR has been prepared with the financial assistance of ADB, therefore the report has been prepared in English.

The proposed road alignment does not pass through any National Parks, Wildlife Reserves, Hunting Reserves or any other protected areas and their buffer zone.

RCIP is categorized as category “B” project according to ADB Safeguard Policy Statement (SPS), 2009. A Category “B” Project has to undertake an IEE level of Study according to the policy statement.

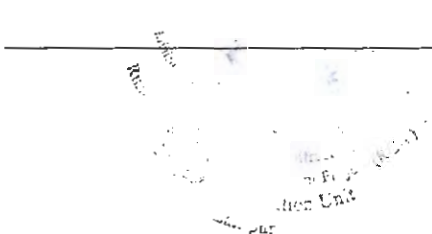
This IEE report has been prepared as per the approved Terms of Reference (approved date - 2078/08/13) through secretary level decision by Ministry of Federal Affairs and General Administration.

2.5 Objectives of IEE

The main objective of IEE Study is to identify the impacts due to implementation and operation of proposed road on the environment (physical, biological and socio-economic and cultural) and propose mitigation measures to avoid or mitigate such impacts during construction and operation phase.

The objectives of the proposed IEE include to:

- To identify and establish the physical, biological and socioeconomic & cultural baseline conditions of the subproject area;
- To identify beneficial and adverse environmental impacts of the subproject during construction and operation phases;
- To analyse the significance of the impacts in terms of the magnitude, extent and duration;



- To suggest mitigation measures for the adverse impacts and enhancement measures for beneficial impacts;
- To prepare environmental management plan (EMP) and propose monitoring mechanism of implementation of EMP;
- To involve public in the decision-making process related to the environment;
- To provide information to the decision makers regarding further action and about the environmental implications due to the development of the proposed subproject;
- To fit the IEE into the context of existing policies, rules and administrative procedures; and
- To ensure that the IEE study is sufficient for the implementation of the subproject.

2.6 Impact on Land Use

Community Participation Plan (CPP) team had identified the affected land through cadastral survey and verified ownership of the affected parcel from land revenue office. Cadastral survey identified total 21.08 ha land to be affected. Out of 21.08 ha land, 8.52 ha is covered by existing road and additionally 12.56 ha private land (including agricultural land, settlement and private forest) is to be acquired. From the additional land to be acquired, CPP team has identified that 7.93 ha is a verified private land, 4.63 ha is unverified land. Further, 0.91 ha forest land is required for the implementation of road upgrading subproject. This additional land requirements will be permanently changed to road surface. The proposed project also requires the temporary land for the establishment of Project Facilities such as camp site, stockpiling, etc. The estimated temporary land is 0.45 ha (excluding musk disposal). The identified location for the campsite is at Ch. (14+400) and ch. (26+500). The identified location for stockpiling is at ch. (14+550). The approximate land required for musk disposal is 0.7 ha. The identified locations for the musk disposal are Sunkoshi River beach (6 km from 5+500), 25+200 (Galpa), 29+800, 29+900 and 31+000. The details of land use pattern are shown in Table 2-1

Table 2-1: Land Use Change along the Road Alignment

| SN | Project Scope | Immediate Land use along the Road (Ha) | | | | | | | Total Area (Ha.) |
|-----|--|--|-------|--------|------|-----------------|-------------|------|------------------|
| | | Agriculture Land | | Forest | | Settlement Area | Barren Land | | |
| | | Govt. | Pvt. | Govt. | Pvt. | | Govt. | Pvt. | |
| 1 | Permanent Land use Change | | | | | | | | |
| 1.1 | Formation Width | - | 12.52 | 0.91 | 0.04 | 0 | - | 0 | 13.51 |
| 1.2 | Muck disposal site | - | - | - | - | - | - | 0.7 | 0.7 |
| 2 | Temporary Land use Change | | | | | | | | |
| 2.1 | Camp Site, Parking lots, Material storage yard | - | 0.45 | - | - | - | - | - | 0.45 |

2.7 Adverse Impact on Environment

There will be permanent change in 13.51 ha of land to the road area. The subproject needs to acquire 0.95 ha forest land (Government forest - 0.91ha, private forest - 0.04ha) from where a total of 451 trees will be cut down. 3.42 ha of forest area lies within the RoW of the road but there will be no construction activities and no need to acquire this area. The subproject needs to acquire 12.52 ha of private land (including agricultural land, settlement land). The subproject also requires additional area approximately 0.45 ha for establishing camp site, material storage yard, parking lot etc. The change in land use for this purpose is temporary.

During the construction, there will be chance of air pollution due to the excavation, noise pollution due to use of construction machinery equipment and vehicles and water pollution due to the use of chemicals like petroleum, bitumen, etc.

2.8 Population and HHs Directly Affected by the Subproject

The total number of households in subproject palika (Sunapati RM, Khandadevi RM and Doramba RM) is 14,897 (Source: CBS 2011). The total population of these palika is 68,854 (Male-31,448 and Female-37,406).

The CPP team revealed that 750 plots are affected by the implementation of subproject. Out of which, plots verified as private land is 509 plots (holding – 361 HHs) and plots unverified is 241 plots. The subproject affected indigenous household is 157 HHs, vulnerable households is 11 HHs (dalit) and number of women headed HHs is 25 HHs.

2.9 Impact on Local Infrastructure/ Services/Facilities

During the implementation of the subproject, few infrastructures need to be re-located for disruption of the service. It includes 112 numbers of electric poles and 3 water tanks.

2.10 Project Specific Problems, Challenges and Opportunities

As the road runs through the hilly terrain, road accident will be the major problem during the construction and operation phases. Landslide and erosion are other challenges during the construction/widening.

Regarding the opportunities, the local will get the employment opportunities during the construction resulting the better income and livelihood improvement. In addition to this, local will get the improved road access.

2.11 Methods Adopted During the Study

The IEE approach, methodology and procedure generally follow the provisions of the EPA, 2076 and EPR, 2077. Following approach and methodology were adopted during the IEE report preparation.

2.11.1 Desk Study

The following steps were followed during the desk review:

- Collection and review of secondary sources of information from various sources. Secondary information was collected through published and unpublished reports and interpretation of maps and photographs. The sources information was DOLI and

DoR/GESU documents and manuals, municipal profiles, other line agencies, related NGOs and other project offices in the ward;

- Delineation of geographical boundary of the influence area on the topographical map;
- Preparation of the proposed project specific checklist for public consultation and data collection on physical, biological and socio-economic and cultural baseline of the subproject.

The general climatological and meteorological information of the subproject were taken from the DHM. Altitude and Landscape data of the subproject area was taken from topographic map, survey data and observation. Land use pattern of the study area was derived from review of topographical map, Google Image and Geographic Information System (GIS) map of the area. For socio-economic and cultural environment, demographic data was collected through CBS, local levels Profiles etc.

2.11.2 Field Work

Various activities were performed during the field study. The major activities are discussed below;

2.11.2.1 Walk Through Survey

The IEE team walked through the proposed road alignment and its surrounding visiting the significant environmental features and make necessary measurements, inspect/observe and discuss it with the local stakeholders. The relevant information and required baseline data were collected covering the physical, biological, socio-economic and cultural aspects of the environment. A separate social team (CPP team) was formed to collect information through primary as well as secondary sources and their analysis leading to prepare a Community Participation Plan (CPP) report. Initially, the local government representatives have been informed about the subproject and with their coordination, the meaningful consultation meeting have been organized with the participation of community representatives. Their viewpoints, inquiry and suggestions have been noted and clarified. Then, the transect Walk Survey (2078/10/04 to 2078/11/24) has been conducted in the existing alignment with the coordination and participation of land and structure owner, local elected representatives and stakeholders. At the same time, their group consents have been gained for the support of construction work as well as for voluntary donation of land, in any.

2.11.2.2 Field Observation and Measurements

Information on Rock type, soil type, slope stability, erosion, landslides, flood area etc. of the road subproject influences area were collected through site observation, measurements, geological maps and consultations. Land use pattern derived from secondary information was verified in the field through observation.

Air quality of the subproject area was determined using Air Quality Detector. Noise level of the subproject area was measured by noise level meter and for water quality, water samples from spring/stream sources where the proposed road crosses, were collected and tested in lab.

Walk-through survey was conducted at subproject site to make general observation of the vegetation type and wildlife in different subproject components.

Total count of trees within the proposed formation width that are to be cut due to subproject

activities was done. The girth of the tree was measured at the height of 1.3 m from ground. The type of tree, height and coverage of the tree was also noted. Group meetings were carried out within major settlements to collect the information on forest and wildlife.

CPP team had carried out the transect walk with the involvement of beneficiaries and people's representatives to identify the extent of impact on land, livelihood and structures within formation width of proposed subproject. Land related information and socio-economic information is collected from consultation with Vulnerable Affected Persons (VAPs) and has been verified with their Lalpurja (Land ownership certificate). The affected land parcel was identified through the cadastral survey and ownership of the affected parcel was verified from land revenue office. RCIP project intends to take minor additional land through the volunteer donation. During the report preparation, CPP team had carried out the cadastral survey of the existing road as well as the additional road strip based on the extreme edge.

2.11.2.3 Household Survey

CPP team has carried out a rapid census survey of the affected household (199 HHs) for affected land and properties, and other socio-economic and cultural data. In addition to this, a household survey (179 HHs) in the DIZ was also carried out for general socio-economic and cultural data. The questionnaire for the household survey is presented in the annex.

2.11.2.4 Public Consultation, Public Hearing and Focus Group Discussion

In order to ensure the public involvement, the following procedures were followed:

- Initial interaction and consultation with the local community and municipal level stakeholders.
- Public Hearing: Public hearing was conducted within the subproject area as per rule 6 (1) of EPR 2077 and collect comments and suggestions from related stakeholders including local people, users' groups, and local representatives.

A public hearing notice was published on 16th Falgun 2078 in Palika Aawaz weekly newspaper published from Manthali, Ramechhap. Public hearings were organized in ward no 2 office of Doramba Sailung Rural Municipality (RM) on Falgun 26, 2078 and office of Sunapati RM on Falgun 27, 2078. Minutes are attached in Appendix 5 and Deed of Enquiry is attached in Appendix 7.

In the public hearing, very few female participants took part in the program. Most of the members of the local committee and groups are male. So, participants from the local stakeholders and forest user groups are male participants.

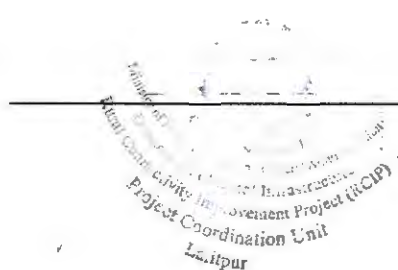




Figure 2-1: Public Hearing at Sunapati Rural Municipality office

Table 2-2: Summary of Public Hearing

| S.N. | Date | Place for Public Hearing | No. of Participants | | Issues and Decisions of Meeting |
|------|------------|--------------------------|---------------------|---|---|
| | | | M | F | |
| 1 | 2078-11-26 | Doramba Sailung RM-02 | 30 | 7 | Loss of forest, issue of employment, landslide and erosion issues, local infrastructures Decisions: minimize adverse impacts and landslides erosion losses, Employment opportunities to local based on available skill and expertise, preservation and rehabilitation of local infrastructures like irrigation canal, water supply pipe etc. Follow the existing centerline as much as possible. |
| 2 | 2078-11-27 | Sunapati RM office | 35 | 2 | Loss of forest, employment issue, issue of habitat of wild lives and drinking water sources Decided to preserve environment with minimum loss, minimize adverse impacts and landslides erosion losses, forest conservation, employment priority to local etc. |

- Publication of Notice: As per rule 7 (2) of EPR 2077, a 7-day public notice was pasted in offices of local level affected due to the subproject, health posts, educational organizations, etc. in the format provided in EPR Schedule 9 and Deed of Enquiry (Muchulkas) was obtained. After this, the similar notice was published on local newspaper as per rule 7(3) of EPR, 2077.

Publication of the notice

A 7-day public notice was published in a weekly newspaper (Palika Aawaz 2078/11/30, Manthali, Ramechhap) seeking written opinion from concerned, rural municipalities, wards (Sunapati, Khandadevi and Doramba), schools, Health post, Division Forest Office, community forest users' group and other related local organizations. A copy of public notice

was affixed in above mentioned organizations and deed of enquiry (Muchulka) was collected.

- Opinions and Suggestions with Recommendation letters from concerned DCCs, municipality/rural municipality were also obtained;
- The IEE study team also carried out interaction with local communities and related stakeholders and collected their concerns and suggestions.

Public notice, deed of enquiry or Muchulka and Opinions and Suggestions with recommendation letters were attached in Appendix 6, Appendix 7 and Appendix 8 respectively.

Table 2-3: Summary of Opinions and Suggestions

| S · N | Date | From | Opinions and Suggestions | Remarks |
|-------------|------------|--|---|---|
| 1 | 4/23/2079 | Division Forest Office, Sindhuli | Subproject should focus on the enhancement measures such as | Interested locals will have opportunity to work in the project especially affected households, women, vulnerable people, etc. |
| 2 | 12/6/2078 | Sunapati Rural Municipality, Ward 2 Office | • During bio-engineering, Amliso should be given priority for plantation. | Subproject will coordinate with Division Forest Office, Forest Development Fund Office prior to acquisition of forest land and felling of trees within propose formation width. |
| 3 | 12/13/2078 | Sunapati Rural Municipality, Ward 3 Office | • The sub project should assure the plantation tree before cutting down the tree. | |
| 4 | 12/16/2078 | Sunapati Rural Municipality, Ward 4 Office | • The road side should be planted with income generating species of trees. | |
| 5 | 12/13/2078 | Sunapati Rural Municipality, Ward 5 Office | • High priority should be given to control landslide | |
| 6 | 12/20/2078 | Doramba Sailing Rural Municipality, Ward 2 Office | • Employment Opportunity | |
| 7 | 11/30/2078 | Shree Sunapati Salleni Community Forest User Group | • Increase in Income | Subproject will make compensation to the use of forest land and felling of trees as per the guidelines provided. |
| 8 | 11/30/2078 | Shree Agleshwori Community Forest User Group | • Skill Development | |
| | | | • Ease access | |
| | | | • Opportunity for | |
| | | | • Saving in time and transportation expenses | |
| 9 | 11/30/2078 | Shree Bhumithan Community Forest User Group | • Development in trade and business | Water sprinkling will be done to minimize dust. |
| | | | • Local people migration may be controlled | |
| | | | • Ease access to Health institute and Education institute | |
| | | | Subproject should minimize negative impacts such as | |
| | | | • Dust pollution | |
| | | | • Water pollution | |
| | | | • Tree felling | |

2.11.2.5 Community Participation Plan (CPP)

Community Participation Plan (CCP) for the proposed road upgrading subproject was prepared as separate volume and its findings is summarized in IEE report. CPP was prepared based on the transect walkover survey, community participation and consultation meetings with affected land owners for the willingness to donate their affected area of land voluntary or not. The assessment was based on document reviews (including census data), formal and informal consultative meetings with appropriate agencies and NGOs, household surveys, group focus discussions and discussions with Affected Peoples (AP) and other persons, (professional, academic) with relevant contributions. Making first level estimates of properties for acquiring roadside improvements based on a preliminary identification of

areas of land and building or other structures affected by the construction along the alignment from the topographic survey, followed by a field verification to determine the details and types of lands/buildings/structures actually affected. Due attention was given to developing measures and technical options to minimize resettlement impact. The CPP has detailed the mitigation measures and responsibility for loss of land, loss of structures, loss of livelihood, loss of assets such as trees and ponds, loss of community assets, increased road safety risks other impacts. The relevant information from CPP is described in the IEE report.

2.11.2.6 *Final Report Preparation*

The IEE report was prepared by the study team of consultant and is submitted to RCIP/DOLI and MoFAGA for further processing.

3 DESCRIPTION OF THE SUBPROJECT

3.1 Subproject Location

The subproject is located in Ramechhap District. The proposed road alignment (33.75 km) passes through Sunapati Rural Municipality, Khandadevi Rural Municipality and Doramba Rural Municipality of Ramechhap District, Bagmati Province. This subproject connects Katunje, Bhwasu, Dahu, Bethan, Hiledevi, Kama, Dimipokhari, Galpa, Jate and Doramba. The subproject location is shown in Figure 3-1

Lubughat - Galpa - Doramba Road subproject lies mostly within Sunapati Rural Municipality (25.13 km) and some section lies within Khandadevi Rural Municipality (3 km) and Doramba Sailung Rural Municipality (5.14 km) of Ramechhap District and assist in connecting rural areas of the rural municipalities with Mid-Hill Road at Lubughat. The starting elevation is 1,245 m and the end elevation is 1,849m. The lowest elevation the road passes is 1,096m at CH 7+170. Entire alignment runs through hilly terrain crossing some minor kholsi and stream crossings.

The road connects wards 2, 3, 4 and 5 of Sunapati Rural Municipality, ward 7 of Khandadevi Rural Municipality and ward no. 2 of Doramba Sailung Rural Municipality. The road passes through different settlements like Katunje, Bhwasu, Dahu, Bethan, Hiledevi, Kama, Dimipokhari, Galpa, Jate, Doramba etc.

The existing road is of earthen/gravel surface and the road width varies from 3 m to 5.5 m. the track was opened by locals in coordination with VDC (now rural municipality) during 2062 B.S. Existing retaining structures to address the slope failures and existing drainage structures for efficient drainage of the catchment seems to be inadequate. After upgradation, the road will be blacked topped intermediate lane with carriage way of 5.5 m, shoulder width of 0.75 m on both sides and formation width of 8.125 m (Field visit and Draft DPR 2021).

Culvert along the road alignment

The alignment runs through Mountainous terrain with a stream crossing at Ch. 1 +290 and Ch. 17+210. A slab culverts of span 5 m is proposed at the crossing. Total 71 pipe culverts (diameter – 0.9m and length – 10m) have been proposed along the alignment. The position may be either a minor kholsi or the valley section in road longitudinal profile where cross drainage is required for drain out the road side drain.

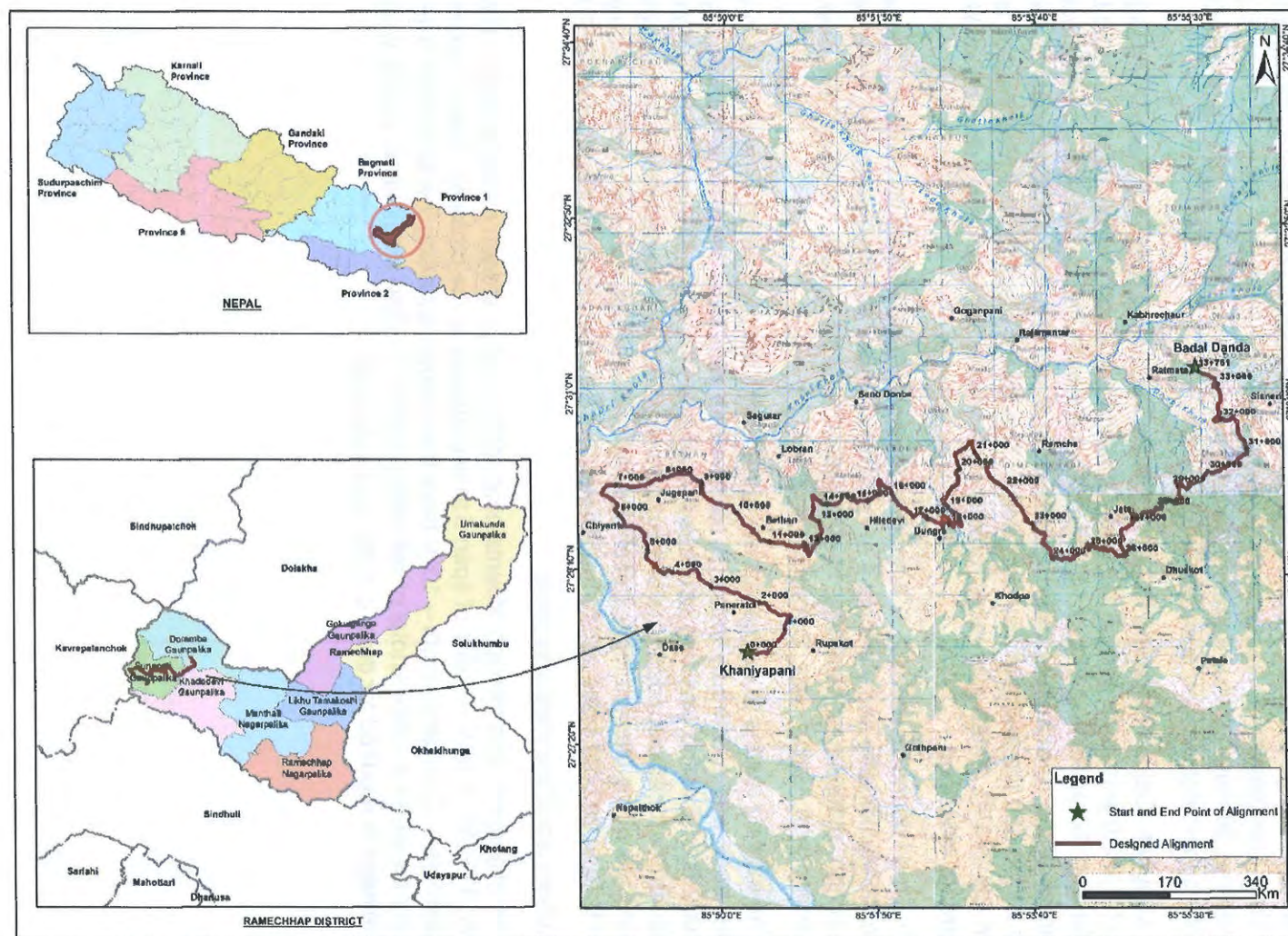


Figure 3-1: Location Map of the Road (Source: Department of Survey)

Ministry of Federal Affairs and General Administration
Department of Local Infrastructure
Project Coordination Unit
Kathmandu

Joint Venture
2076
AVIYAAN-SOUTHEAST
New Ramechhap Road
Kathmandu

Ministry of Federal Affairs and General Administration
Government of Nepal
Singha Durbar, Kathmandu

3.2 Salient Features of the Subproject

Salient features of the subproject are given in table below.

Table 3-1: Salient feature of the subproject

| Name of the Subproject | Upgrading of Lubughat - Galpa - Doramba Road |
|------------------------------------|---|
| Location | |
| Province | Bagmati |
| District | Ramechhap |
| Start Point | Khaniyapani, Sunapati Rural Municipality ward no. 5 (27.471878N Latitude, 85.809423E Longitude) |
| End Point | Badal Danda, Doramba Rural Municipality ward no. 2 (27.52200N Latitude, 85.935922E Longitude) |
| Name of Rural Municipalities/wards | Sunapati Rural Municipality (ward nos. 2, 3, 4 and 5), Khandadevi Rural Municipality (ward no. 7) and Doramba Sailung Rural Municipality (ward no. 2) |
| Major Settlement | Katunje, Bhwasu, Dahu, Bethan, Bhalbari, Hiledevi, Kama, Dimipokhari, Galpa, Jate, Doramba |
| Geographical Feature | |
| Terrain | Mountainous |
| Geology | Lesser-Himalaya Zone |
| Altitude (maximum, minimum) | Max 2296 m, Min 1096 m |
| Climate | Subtropical |
| Road Classification | |
| Classification | Class IV as per NRS 2070 |
| Road Type | District Road |
| Length of Road | 33.75 Km |
| Standard of Pavement | DBST / Bituminous Penetration Macadam (BPM) |
| Design Parameter | |
| Design Period | 10 Yr |
| Design Speed | 30 kmph |
| Right of Way (m) | 20 m (10 on either side from center line) (NRS 2070, Section 11.9.1) |
| Carriageway Width (m) | 5.5 m |
| Formation Width (m) | 7.00 m (without drain) |
| Shoulder Width (m) | 0.75 m on both side |
| Design Capacity | 0.149 msa |
| PCU | 696 |
| Maximum Superelevation | 7% |
| Camber | 2.5% |
| Quantity of excavation | 575,767.34 Cum |
| Quantity of filling | 49,194.69 Cum |
| Existing Structures | |
| Gabion Wall (m) | 245 m |

| | |
|---------------------------------|---|
| Masonry Wall (m) | 195 |
| Proposed Structures | |
| Slab Culverts (No) | 2nos of 5m span at Ch. km (1+290) and Ch. Km (17+210) |
| Pipe Culvert (No) | 71 nos (diameter – 0.9 m and length – 10m) |
| Masonry Wall (m) | 13,272.5 |
| Gabion Wall (m) | 1,155 |
| Cost of Subproject (NRs) | 1,610,139,960.00 (including VAT and contingencies) |
| Cost per Km (NRs) | 40,741,993.00 (excluding physical and price contingencies) |
| EMP Cost (NRs) | 51,240,120.00 (excluding BoQ items price and contingencies) |

Source: Detailed Project Report for "Upgrading of Lubughat – Galpa – Doramba Road", 2022

Ministry of Federal Affairs and General Administration
Department of Local Development
Rural Connectivity Improvement Project (Roads)
Project Coordination Unit
Lalitpur



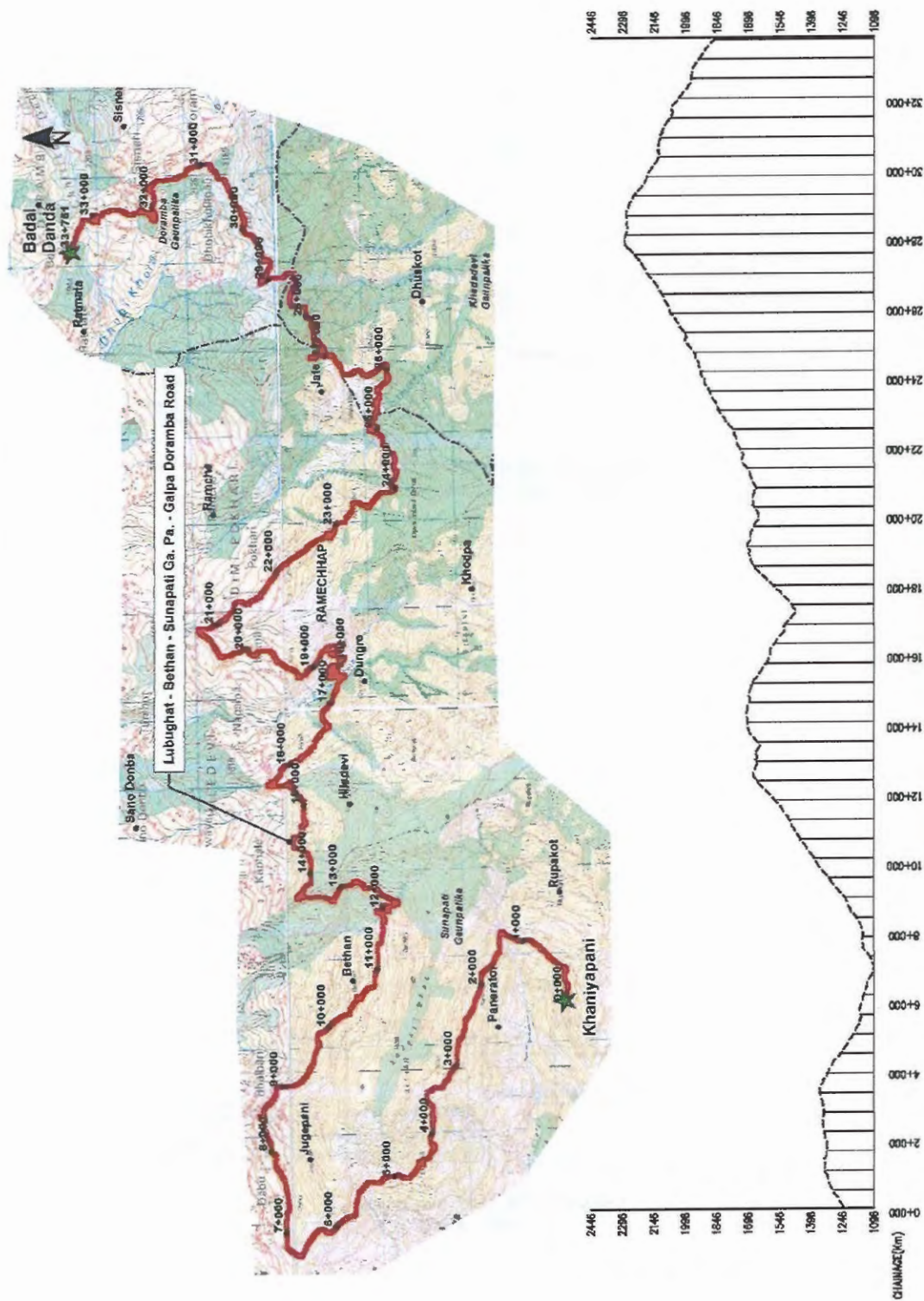
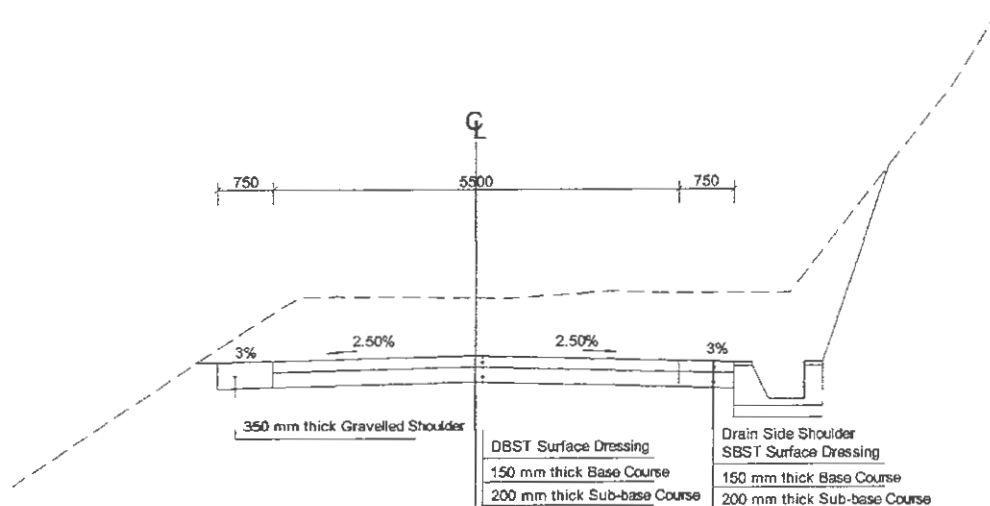
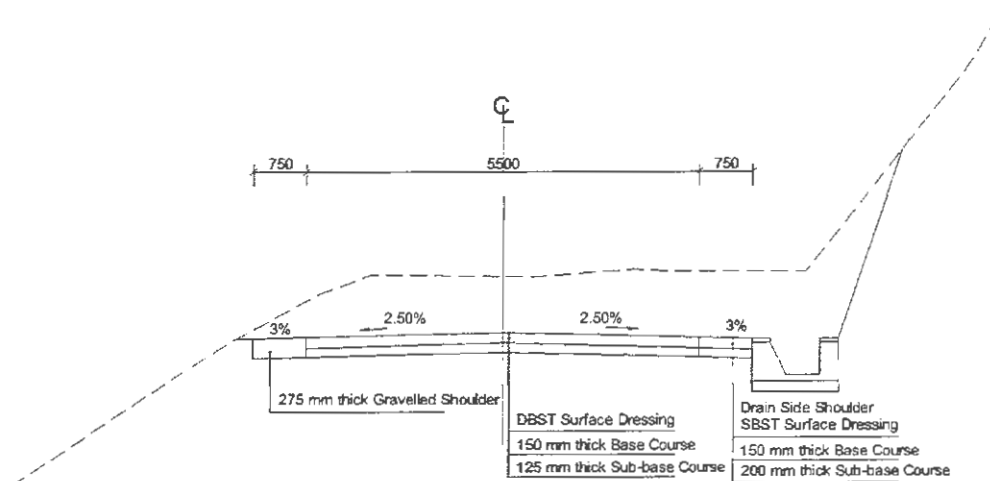


Figure 3-2: Plan and Profile of Proposed Road



TYPICAL ROAD CROSS SECTION
Ch: 0+000 - 10+000; Ch: 20+000 - 33+752



TYPICAL ROAD CROSS SECTION
Ch 10+000 - 20+000

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Rural Connectivity
Project Coordination Unit
Lalitpur



Ministry of Federal Affairs and General Administration
Government of Nepal
Singha Durbar, Kathmandu

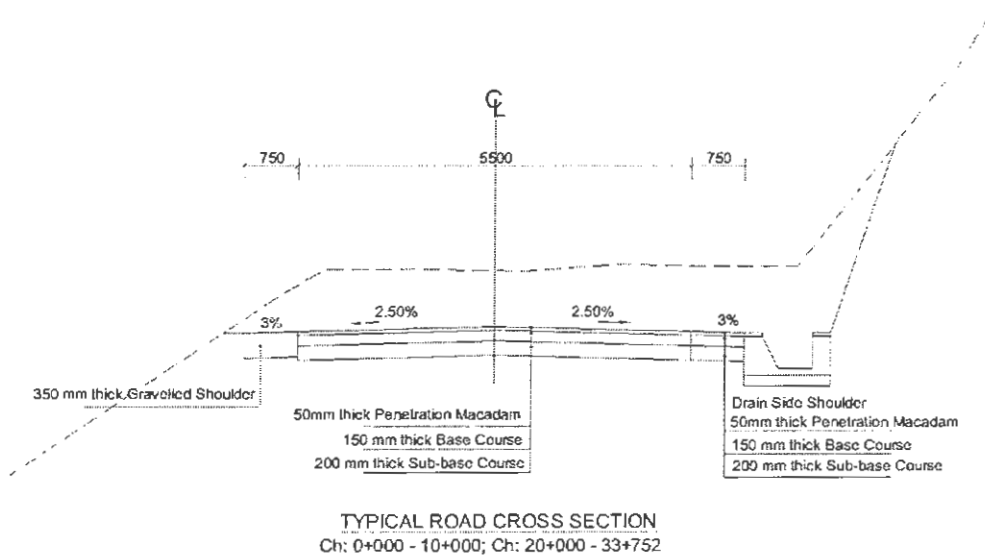
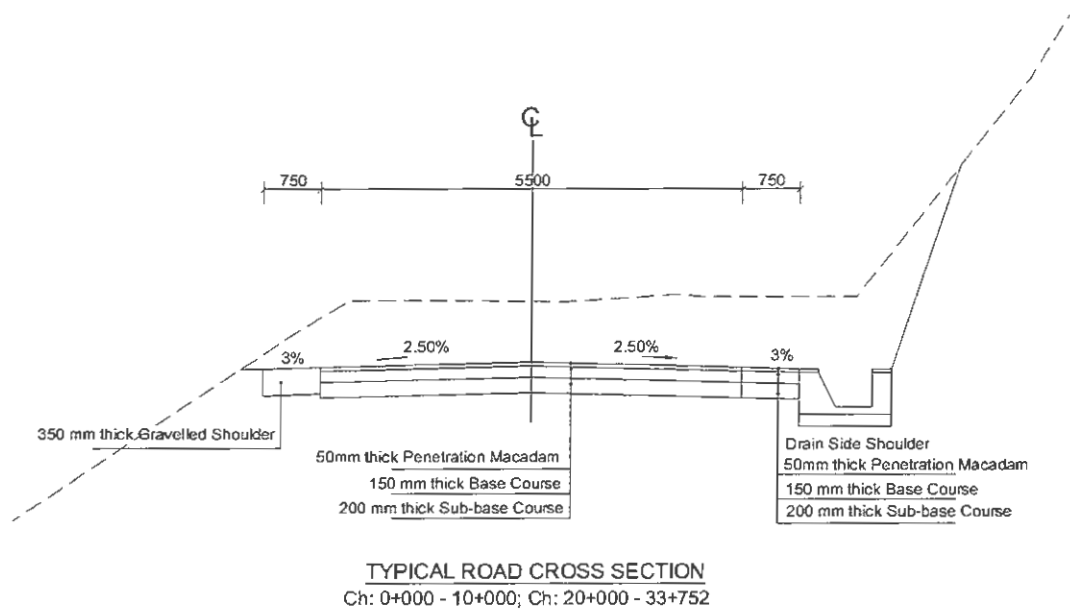


Figure 3-3: Typical Cross-section of Designed Road

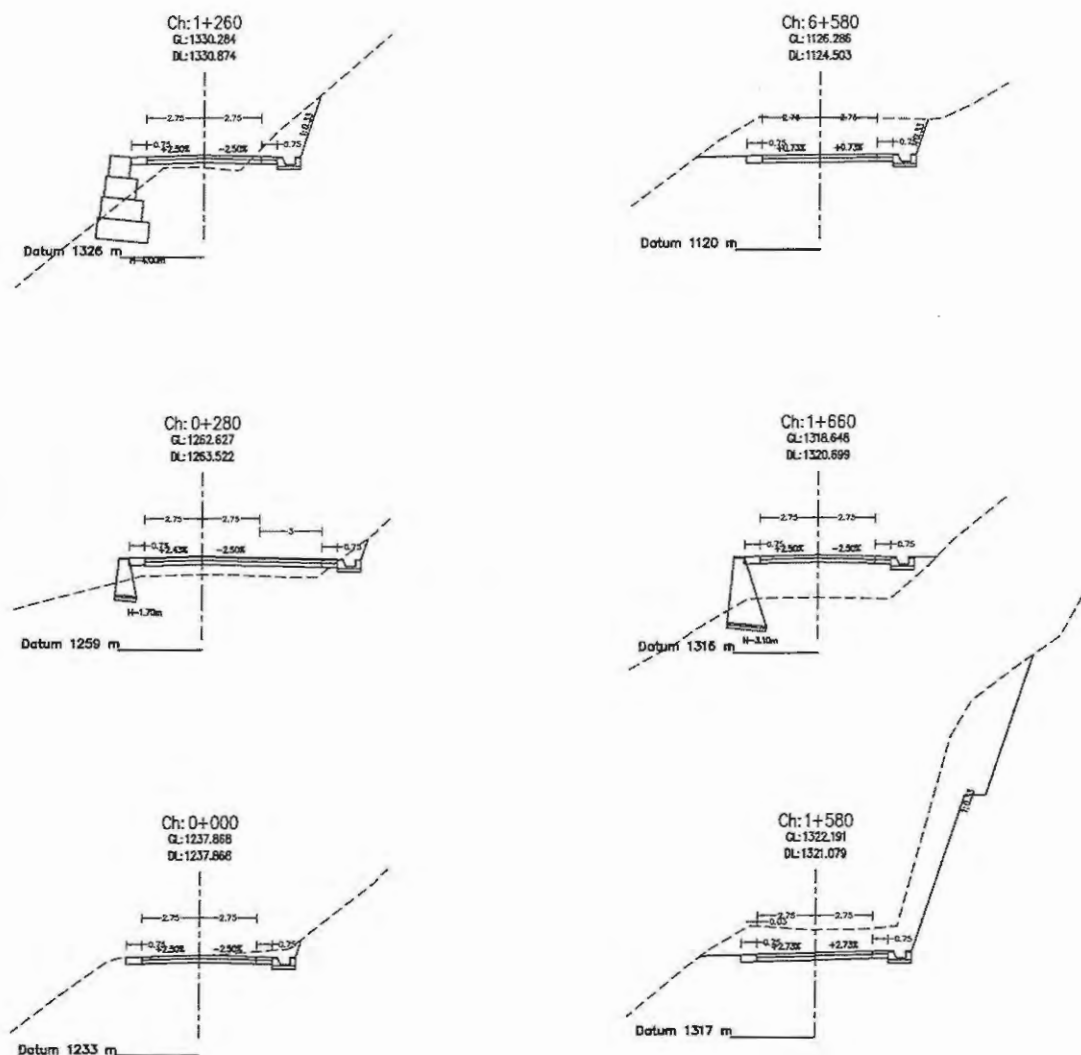


Figure 3-4: Cross-section of Designed Road at various chainages

3.3 Materials and Equipment to be Used

The materials and equipment to be used for the construction of road alignment are provided in Table 3-2.

Table 3-2: Materials and equipment to be used

| S.N. | Item Description | Unit | Quantity | Rate | Amount |
|-----------------|-------------------------|------|----------|----------|---------------|
| Material | | | | | |
| 1 | Aggregate 10mm and down | cum | 196.38 | 1,689.66 | 331,820.99 |
| 2 | Aggregate 10-20mm | cum | 446.49 | 2,164.66 | 966,499.38 |
| 3 | Aggregate 20-40mm | cum | 7,342.17 | 2,164.66 | 15,893,304.53 |
| 4 | Binding wire | kg | 352.60 | 115.85 | 40,849.49 |

Initial Environmental Examination (IEE) of Lubughat-Galpa-Doramba Road, Ramechhap District

| S.N. | Item Description | Unit | Quantity | Rate | Amount |
|------|--|------|-----------|-----------|-----------------------|
| 5 | Bitumen | t | 820.61 | 79,000.00 | 64,827,928.04 |
| 6 | Boulders/stones | cum | 14,272.26 | 1,564.66 | 22,331,231.20 |
| 7 | Cement | t | 5,933.35 | 17,150.80 | 101,761,759.47 |
| 8 | Coarse Agg. | cum | 3,473.35 | 2,164.66 | 7,518,627.44 |
| 9 | Coarse sand | cum | 3,992.52 | 2,039.66 | 8,143,388.19 |
| 10 | Compost | cum | 19.55 | 1,000.00 | 19,550.00 |
| 11 | Geotextile | sqm | 10,800.81 | 117.00 | 1,263,695.19 |
| 12 | Grass cuttings | no | 76407 | 4.00 | 305,628.00 |
| 13 | Grass slips | no | 127400 | 4.00 | 509,600.00 |
| 14 | Green Mulch | cum | 15.64 | 150.00 | 2,346.00 |
| 15 | Hardwood cutting of at least 1 m in length | m | 3400 | 10.00 | 34,000.00 |
| 16 | Hessian jute | sqm | 550.28 | 20.00 | 11,005.58 |
| 17 | Key Agg. | cum | 868.34 | 2,164.66 | 1,879,656.86 |
| 18 | Live pegs | no | 25480 | 8.00 | 203,840.00 |
| 19 | RCC Pipe 900mm NP3 | m | 710 | 13,614.63 | 9,666,389.67 |
| 20 | Sand | cum | 15,488.02 | 2,239.66 | 34,687,905.72 |
| 21 | Seedling | no | 3910 | 13.00 | 50,830.00 |
| 22 | Water | KL | 30,230.04 | 400.00 | 12,092,015.01 |
| 23 | Stone | cum | 55,387.16 | 1,564.66 | 86,662,072.20 |
| 24 | Sub base Material S1 type or S2 type | cum | 64,770.33 | 1,564.66 | 101,343,543.91 |
| 25 | Aggregate 63 mm to 45 mm | cum | 15,669.57 | 1,839.66 | 28,826,682.37 |
| 26 | Aggregate 22.5 mm to 5.6 mm | cum | 15,032.68 | 2,164.66 | 32,540,634.93 |
| 27 | Aggregate Below 5.6 mm | cum | 16,587.10 | 1,689.66 | 28,026,551.58 |
| 28 | HYSD bars | t | 48.48 | 76,950.80 | 3,730,812.71 |
| 29 | Chips, 19 mm nominal size | cum | 3,076.08 | 2,164.66 | 6,658,667.98 |
| 30 | Crushed stone chipping, 10mm nominal size | cum | 1,443.00 | 1,689.66 | 2,438,177.74 |
| 31 | Additive Material | kg | 1,994.93 | 321.00 | 640,372.08 |
| 32 | Mild Steel Channel iron 75*40*6 mm | kg | 2,839.68 | 84.45 | 239,813.25 |
| 33 | Angle Iron 50*50*6 mm for hold fast | kg | 25.44 | 79.45 | 2,021.23 |
| 34 | 90cm height equilateral triangle | sqm | 33.36 | 330.00 | 11,008.80 |
| 35 | Paint | lit | 283.82 | 465.00 | 131,975.86 |
| 36 | Hot Applied thermoplastic compound | lit | 15,693.99 | 520.00 | 8,160,874.53 |
| 37 | Reflectorizing glass beads | kg | 1,687.53 | 159.00 | 268,316.59 |
| 38 | Hot dip galvanized Channel post 150 x 75 x 5 mm | kg | 34,602.12 | 198.45 | 6,866,818.40 |
| 39 | Hot dip galvanized Spacer Channel post 150 x 75 x 5 mm | kg | 6,343.62 | 198.45 | 1,258,896.96 |
| 40 | Hot dip galvanized Corrugated W beam sheet 3mm thick | kg | 28,039.60 | 198.45 | 5,564,480.56 |
| 41 | Heavy zinc coated hexagonal mesh type 100 mm x 120 mm, mesh wire 3 mm, selvage wire 3.9 mm, lacing wire 2.4 mm | Sqm | 70,956.43 | 270.15 | 19,168,878.91 |
| 42 | Pole | No. | 112 | 12,329.00 | 1,380,848.00 |
| 43 | Transmission Wire | rm | 33600 | 72.00 | 2,419,200.00 |
| | Total Material Cost | | | | 618,882,519.33 |
| | Equipment | | | | |
| 1 | Air Compressor | hr | 969.13 | 1,459.00 | 1,413,956.35 |
| 2 | Boiler | hr | 950.53 | 858.00 | 815,552.20 |
| 3 | Chips Spreader | hr | 365.95 | 4,444.00 | 1,626,291.19 |
| 4 | Concrete Mixer | hr | 3,548.91 | 523.00 | 1,856,079.29 |
| 5 | Crane | hr | 67.20 | 3,102.00 | 208,454.40 |
| 6 | Drilling machines and accessories | hr | 18.60 | 20.00 | 372.00 |

| S.N. | Item Description | Unit | Quantity | Rate | Amount |
|---|--------------------------------|------|-----------|----------|-----------------------|
| 7 | Generator (< 2 KVA) | hr | 4,499.44 | 117.00 | 526,433.99 |
| 8 | Pneumatic Tyred Roller | hr | 577.53 | 3,319.00 | 1,916,832.03 |
| 9 | Tractor | hr | 3,246.38 | 1,110.00 | 3,603,476.67 |
| 10 | Vibrator Roller | hr | 4,473.37 | 2,413.00 | 10,794,235.73 |
| 11 | Motor Grader | hr | 2,593.02 | 3,618.00 | 9,381,538.64 |
| 12 | Hydraulic Excavator | hr | 10,276.41 | 3,570.00 | 36,686,776.41 |
| 13 | B. Distributor | hr | 712.90 | 4,377.00 | 3,120,342.64 |
| 14 | Road Marking Machine | hr | 168.75 | 1,004.00 | 169,427.59 |
| 15 | Dozer | hr | 983.89 | 5,891.00 | 5,796,118.38 |
| 16 | Tractor with ripper attachment | hr | 395.56 | 1,142.00 | 451,733.86 |
| 17 | Mechanical Broom | hr | 950.53 | 2,020.00 | 1,920,064.62 |
| 18 | Bitumen Pressure Distributor | hr | 77.19 | 4,377.00 | 337,841.43 |
| 19 | Tractor-Trolley | hr | 5.79 | 1,110.00 | 6,422.14 |
| Total Materials and Equipment Cost | | | | | 699,514,468.89 |

Source: Detail Road design, 2021

3.4 Energy to be Used

3.4.1 Energy Type

Both gasoline and electrical energy are proposed to be used during the construction phase.

- Diesel in vehicles for material transportation,
- Kerosene for heating of bitumen,
- Petrol in vehicles,
- Electrical energy required will be produced from diesel engine electric generator and
- LPG gas for cooking by labours.

3.4.2 Sources

Petroleum products will be purchased from Nepal Oil Corporation through local dealers (Petrol Pumps). They are proposed to be purchased from Nepalthok, BP highway.

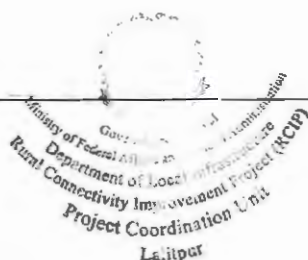
3.5 Human Resources Required

For total construction period, manpower required for the works is estimated at approximately 73,323 md of skilled and 229,324 md unskilled laborers.

Table 3-3: Human Resources required

| SN. | Item Description | Unit | Quantity | Rate (NRs/md) | Amount (NRs) |
|--------------------------|------------------|------|------------|---------------|-----------------------|
| 1 | Unskilled Labour | md | 229,323.54 | 800.00 | 183,458,832.57 |
| 2 | Skilled Labour | md | 73,322.31 | 960.00 | 70,389,414.71 |
| Total Labour Cost | | | | | 253,848,247.28 |

Source: DPR of the Road



3.6 Construction Planning

3.6.1 Procurement

3.6.1.1 Packaging

Based on total cost of the road works which is estimated at NRs. 1,610,139,690 (Including with Contingencies and VAT), two packages with construction period of 36 months are proposed.

3.6.1.2 Bidding Requirement

The project is financed by ADB and thus User Guide for Procurement of Works- Small Contracts is adopted for bidding. This guide is applicable to projects governed by the Procurement Regulations for ADB Borrowers: Goods, Works, non-consulting and Consulting Services (2017), as amended from time to time.

The bidding shall be done using single stage two envelop system. Since the cost is under limit of ADB's ICB, and NCB contract is proposed.

3.6.1.3 Bidding Process

The bidding process for works has been developed, refined and standardised by the RCIP over many years. The standardised procedure which has been developed should be adopted: this involves the following –

- Preparation of bidding documents,
- Publication of procurement notice,
- Issuance of bidding documents,
- Pre-tender meeting,
- Receipt and opening of tenders and
- Analysis of tenders and recommendation for award

3.6.2 Quality Assurance and Quality Control (QAQC)

QAQC for the proposed work will be done as per “Standard Specifications for Road and Bridge Works” published by DoR in 2016. Some highlights for QAQC mentioned in the document is discussed below;

The Contractor is responsible for the quality of the works in the entire construction within the contract. The Contractor has to provide, use and maintain on the Site, throughout the period of execution of the contract, a laboratory with adequate laboratory equipment operated by competent staff for carrying out tests required for the selection and control of the quality of materials and for the control of workmanship in accordance with these Specifications. The list of laboratory equipment to be procured and laboratory facilities to be provided has to get approval from the Engineer. The Contractor is responsible to carry out quality control tests on the materials and work to the frequency stipulated in subsequent paragraphs. The Contractor is responsible for submission of a Quality Assurance Plan (QAP) to the Engineer for his approval. The QAP has to be based on the detailed Program of the Works, and process-oriented focus on defect prevention.

The QAP should include Quality Assurance Schedule which comprises, the recapitulative

test schedule and testing program detailing the list of tests for compliance, laboratory trials, site trials and trials sections, construction control tests and their frequencies, tests for acceptance of the completed works with their dates, recapitulative list of "critical" acceptance testing procedures for equipment or parts of the works which corresponds to the tasks on the Critical Path according to the construction project, number of tests to be carried out, list and number of appropriate equipment to conduct them, list of tests to be conducted outside the site laboratory, identification of the outside laboratory where proposed to carry out the test, list of staff assigned to the laboratory, their position and responsibilities in the quality control procedures, their qualification and experience, general description and detailed organization of the laboratory activities, the list of sources of materials and/or of manufactured articles, their main characteristics, their identification mode as provided by the supplier when required; the program of supply and procurement of material and/or manufactured articles in accordance with the Program pursuant to Clause 115. The QAP document should also include the list of tests and quality control procedures to be implemented by the Subcontractors, if any, pointing out the "critical" acceptance testing procedures relating to the Sub-contracted works, which correspond to the tasks on the Critical Path included in the Sub-contracted works. The Contractor has to implement the Quality Control in compliance with the approved QAP. The Contractor has to monitor and update the QAP on the basis of the decisions taken at the periodic review meetings or as directed by the Engineer and in accordance with the program of the works as per Clause 115 and the Conditions of Contract.

3.6.3 Performance Based Maintenance (PBM)

PBM is designed to increase the efficiency and effectiveness of road maintenance operations by ensuring that the physical condition of roads is adequate for the needs of road users over the entire maintenance period of the Contract.

PBM consists of two main elements:

- Output-based works that are specified, measured and paid by the quantities of works completed and valued at BOQ Unit Rates and Prices or at appropriate Day works Rates and Provisional Sums, in the same way as in a conventional contract, and
- Performance-based works that are assessed qualitatively against service levels that describe the thresholds the Contractor is required to achieve and to be paid at a monthly payment rate. Monthly payments are reduced if the service levels are not maintained.

The output-based works consist of those works that are executed under the Emergency Works. The performance-based works are the Routine Maintenance Works which consist of all the activities, not included in the output-based works that are needed to ensure road assets attain the required Operational Service Levels including the management needed to comply with the Contractor's obligations during the Maintenance Phase of the Works.

3.6.4 Traffic Management Plan

Vehicle and pedestrian traffic need to be carefully managed to ensure safe and efficient movement with minimum delay on the construction site. Traffic management is required to prevent accidents, injury to people and damage to equipment, property and vehicles.

Following measures should be adopted for smooth traffic movement:

- At least a lane should be opened for traffic movement at some interval of time. The Proposed Road is a rural road that has no alternative alignment connecting the same origin and destination. So, the option for complete closure of road with diversion is not available. As the settlements in the project areas used this only road for the movement, the road cannot be closed for a long period.
- In case of narrow sections, the traffic movement can be made in different shifts. So, the notice or signboard should be placed at different locations to notify about the schedule of opening and closing of the road.
- Manually operated Stop/Go signs should be used at both ends of the construction site for traffic movement.
- In culvert construction, temporary diversion with a proper sign should be provided for smooth movement of the traffic.
- The movement of pedestrians and pet animals should be restricted at the valley site to avoid an accident during excavation.
- The hazard area should be properly signed with a reflective signpost so that it is visible even at night.
- The working zone should be properly delineated with safety barriers to avoid an accident. A warning sign should be provided at the advance warning zone. The speed limit of traffic should be set at such a location.
- In case, the road has to be closed, prior notice should be given to concerning offices such as Traffic Police, Municipality/Rural Municipality, District Coordination Committee.

3.6.5 Climate Risk and Vulnerability Assessment

The ADB has committed to assisting its developing member countries in climate proofing projects to ensure their outcomes are not compromised by climate change or by natural hazards in general. The purpose of the climate risk vulnerability assessment is to understand the climate and assess climate change threats to the new road projects, to assess the adaptation measures that are proposed in the road design, to determine to what extent the performance and design of the subproject is vulnerable to climate change, and to recommend measures that will improve the climate resilience of the proposed subproject.

3.6.6 Project Implementation Schedule

The construction period is a key variable in contract delivery. Given the value of works in contract package, a construction period of 36 months is proposed along with Defect liability period of 12 months and the maintenance period for additional 24 months excluding the defect liability period. The proposed schedule is outlined in Figure 3-5.

3.7 Project Area Delineation

Adverse and beneficial environmental impacts are expressed on basis of proximity of activity and magnitude of impact. Based on the environmental impacts of the project, the project-affected areas are classified as the following;



Table 3-4: Impact Study Area Delineation

| Impact category | Impact Area |
|----------------------------|--|
| Direct Impact Zone (DIZ) | 250 m on either side of the center line of the proposed road alignment and location of camp sites, quarry sites, stockpiling sites etc. |
| Indirect Impact Zone (IIZ) | 250 m beyond DIZ on either side of the center line of the proposed road alignment |
| Zone Of Influence (ZOI) | Area from where people will use this road (i.e., different settlements from wards-2,3,4 and 5 of Sunapati Rural Municipality, Ward 7 of Khandadevi Rural Municipality and Ward 2 of Doramba Sailung Rural Municipality of Ramechhap District, Bagmati Province |

Initial Environmental Examination (IEE) of Lubughat-Galpa-Doramba Road, Ramechhap District

| Year/Month | 2022 | | | | | | | 2023 | 2024 | 2025 | | | | | | | | | | | | 2026 | | | | | | | | | | | | 2027-2028 | |
|--|------|---|---|---|---|---|---|------------|------------|------|---|---|---|---|---|---|---|---|---|---|---|------|---|---|---|---|---|---|---|---|---|---|---|-----------|-----------|
| IMPLEMENTATION SCHEDULE | J | J | A | S | O | N | D | 12 Month s | 12 Month s | J | F | M | A | M | J | J | A | S | O | N | D | J | F | M | A | M | J | J | A | S | O | N | D | | |
| Monsoon Period | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Tender Period / Bid Analysis / Contract Award | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Construction Period 36 months | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Defect Liability Period 12 months | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Performance Based Maintenance Period 24 months | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 24 months |

Figure 3-5: Project Implementation Schedule


 Government of Nepal
 Ministry of Federal Affairs and General Administration
 Department of Local Infrastructure
 Rural Connectivity Improvement Project (RCIP)
 Project Coordination Unit
 Lalitpur


 Joint Venture
 2076
 New Baneshwor, Kathmandu


 Government of Nepal
 Ministry of Federal Affairs and General Administration
 Singha Durbar, Kathmandu

4 EXISTING ENVIRONMENTAL CONDITION

4.1 Physical Environment

4.1.1 Location and Topography

The road alignment starts at Khaniyapani. The road alignment passes through Dahu, Bethan, Hilepani, Galpa and reaches Doramba in Ramechhap District. The road alignment passes through Sunapati Rural Municipality (25.13 km), Khandadevi Rural Municipality (3 km) and Doramba Sailung Rural Municipality (5.14) of Ramechhap District. The total length of the road is about 33.75 Km. The end point of the road is Badal Danda of Doramba Rural Municipality of Ramechhap District.

The subproject area is located between latitude 27.471878N - 27.522007N and longitude 85.809423E - 85.935922E. The starting elevation is 1,245m and the end elevation is 1,849m. The lowest elevation of the road is 1,096m at CH 7+170. Entire alignment runs through hilly terrain crossing some minor crossings, cultivated land, forest and settlement.

4.1.2 Land Use

A study of land use pattern was carried out along the road alignment. 32.07 % of the alignment passes through barren land (without cultivation and few bushes). The barren land is just immediately after the road formation and cultivation area after the barren land in most cases). 30.59 % passes through cultivation area, 13.05 % through mix settlement and cultivation area and 24.28% passes through forest area. Details of the land use pattern along the road are presented in Table 4-1.

Table 4-1: Chainage and Land use Pattern along the alignment

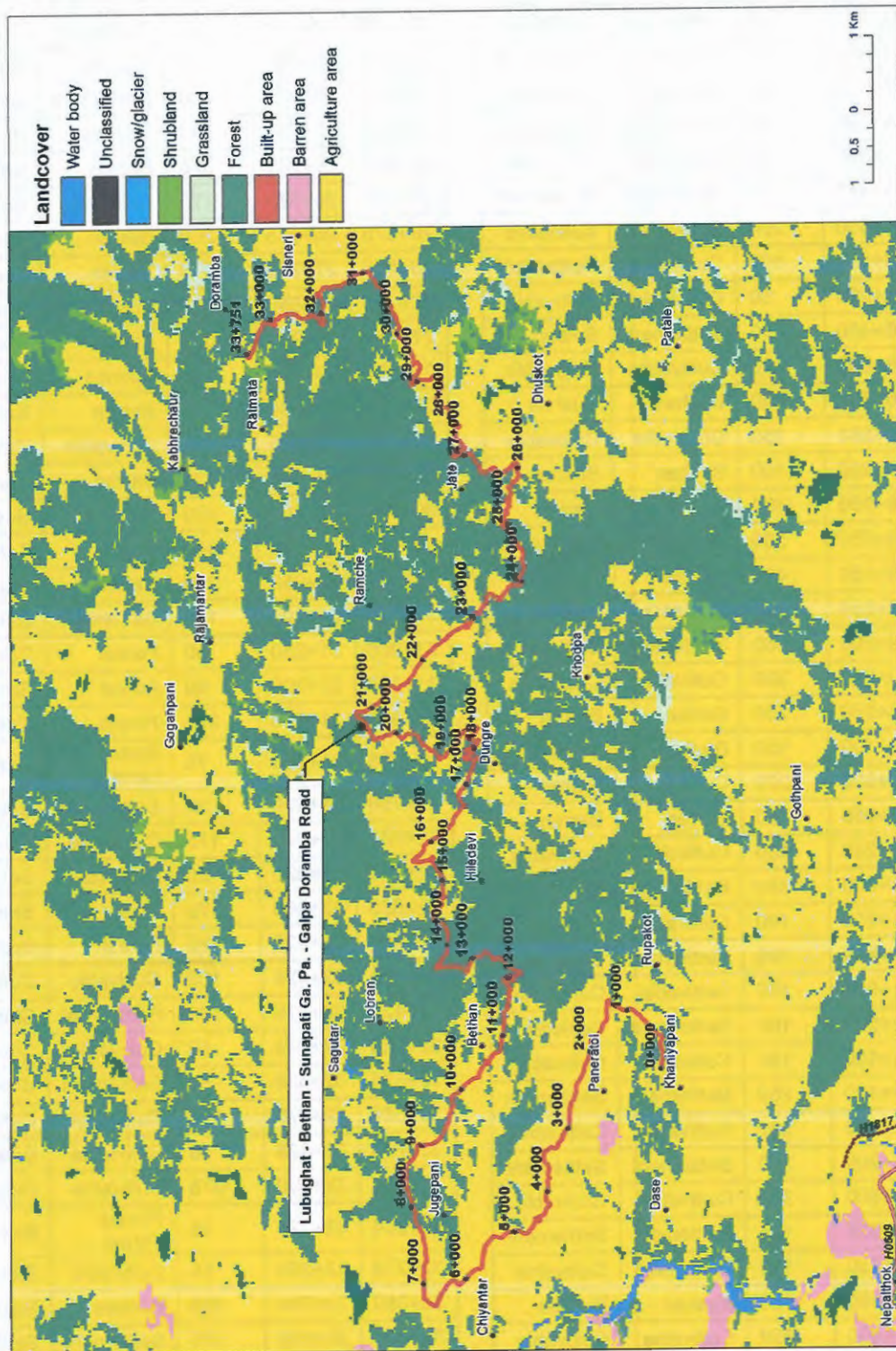
| Chainage | | Length (m) | Land Use Pattern | |
|----------|--------|------------|------------------|----------------|
| From | To | | Left Side | Right Side |
| 0+000 | 0+650 | 650 | Cultivable | Cultivable |
| 0+650 | 0+700 | 50 | Settlement | Settlement |
| 0+700 | 1+250 | 550 | Cultivable | Cultivable |
| 1+250 | 1+750 | 500 | Barren | Barren |
| 1+750 | 1+850 | 100 | Settlement | Settlement |
| 1+850 | 2+050 | 200 | Cultivable | Cultivable |
| 2+050 | 2+250 | 200 | Settlement | Settlement |
| 2+250 | 2+450 | 200 | Cultivable | Cultivable |
| 2+450 | 3+050 | 600 | Settlement | Settlement |
| 3+050 | 3+150 | 100 | Cultivable | Cultivable |
| 3+150 | 3+500 | 350 | Settlement | Settlement |
| 3+500 | 3+750 | 250 | Barren | Barren |
| 3+750 | 3+850 | 100 | Settlement | Settlement |
| 3+850 | 6+650 | 2,800 | Barren | Barren |
| 6+650 | 7+200 | 550 | Settlement | Settlement |
| 7+200 | 7+450 | 250 | Barren | Barren |
| 7+450 | 7+800 | 350 | Settlement | Settlement |
| 7+800 | 7+900 | 100 | Cultivable | Cultivable |
| 7+900 | 8+300 | 400 | Settlement | Settlement |
| 8+300 | 8+450 | 150 | Cultivable | Cultivable |
| 8+450 | 8+650 | 200 | Settlement | Settlement |
| 8+650 | 8+750 | 100 | Private Forest | Private Forest |
| 8+750 | 8+950 | 200 | Settlement | Settlement |
| 8+950 | 9+300 | 350 | Cultivable | Cultivable |
| 9+300 | 9+450 | 150 | Barren | Barren |
| 9+450 | 10+000 | 550 | Cultivable | Cultivable |
| 10+000 | 10+300 | 300 | Settlement | Settlement |
| 10+300 | 10+850 | 550 | Cultivable | Cultivable |
| 10+850 | 11+200 | 350 | Settlement | Settlement |
| 11+200 | 11+350 | 150 | Cultivable | Cultivable |
| 11+350 | 11+650 | 300 | Settlement | Settlement |
| 11+650 | 12+800 | 1,150 | Forest | Forest |
| 12+800 | 13+600 | 800 | Barren | Barren |
| 13+600 | 14+150 | 550 | Barren | Barren |

| Chainage | | Length (m) | Land Use Pattern | |
|----------|--------|------------|------------------|------------|
| From | To | | Left Side | Right Side |
| 14+150 | 14+350 | 200 | Cultivable | Cultivable |
| 14+350 | 14+650 | 300 | Settlement | Settlement |
| 14+650 | 14+850 | 200 | Cultivable | Settlement |
| 14+850 | 15+000 | 150 | Cultivable | Cultivable |
| 15+000 | 15+700 | 700 | Settlement | Settlement |
| 15+700 | 15+800 | 100 | Cultivable | Cultivable |
| 15+800 | 15+850 | 50 | Settlement | Settlement |
| 15+850 | 16+050 | 200 | Cultivable | Cultivable |
| 16+050 | 16+150 | 100 | Cultivable | Settlement |
| 16+150 | 16+200 | 50 | Cultivable | Cultivable |
| 16+200 | 16+450 | 250 | Settlement | Settlement |
| 16+450 | 16+600 | 150 | Cultivable | Cultivable |
| 16+600 | 16+700 | 100 | Bushes | Bushes |
| 16+700 | 16+850 | 150 | Cultivable | Cultivable |
| 16+850 | 17+950 | 1,100 | Bushes | Bushes |
| 17+950 | 18+250 | 300 | Barren | Barren |
| 18+250 | 18+750 | 500 | Cultivable | Cultivable |
| 18+750 | 19+150 | 400 | Barren | Barren |
| 19+150 | 19+250 | 100 | Settlement | Cultivable |
| 19+250 | 19+700 | 450 | Settlement | Settlement |
| 19+700 | 20+000 | 300 | Cultivable | Cultivable |
| 20+000 | 20+250 | 250 | Barren | Barren |
| 20+250 | 20+400 | 150 | Bushes | Bushes |
| 20+400 | 20+600 | 200 | Cultivable | Barren |
| 20+600 | 20+850 | 250 | Barren | Barren |
| 20+850 | 21+250 | 400 | Cultivable | Cultivable |
| 21+250 | 21+600 | 350 | Settlement | Settlement |
| 21+600 | 21+700 | 100 | Cultivable | Cultivable |
| 21+700 | 21+800 | 100 | Settlement | Settlement |
| 21+800 | 21+900 | 100 | Cultivable | Cultivable |
| 21+900 | 22+000 | 100 | Settlement | Settlement |
| 22+000 | 22+150 | 150 | Cultivable | Cultivable |
| 22+150 | 22+400 | 250 | Settlement | Settlement |
| 22+400 | 22+900 | 500 | Cultivable | Cultivable |
| 22+900 | 23+200 | 300 | Settlement | Settlement |
| 23+200 | 23+500 | 300 | Cultivable | Cultivable |
| 23+500 | 23+625 | 125 | Settlement | Settlement |
| 23+625 | 23+750 | 125 | Settlement | Cultivable |
| 23+750 | 24+150 | 400 | Bushes | Bushes |
| 24+150 | 24+400 | 250 | Cultivable | Cultivable |

| Chainage | | Length (m) | Land Use Pattern | |
|----------|--------|------------|------------------|------------|
| From | To | | Left Side | Right Side |
| 24+400 | 24+525 | 125 | Settlement | Settlement |
| 24+525 | 24+650 | 125 | Cultivable | Cultivable |
| 24+650 | 25+025 | 375 | Bushes | Bushes |
| 25+025 | 25+275 | 250 | Settlement | Settlement |
| 25+275 | 25+825 | 550 | Bushes | Bushes |
| 25+825 | 26+200 | 375 | Barren | Barren |
| 26+200 | 26+375 | 175 | Cultivable | Cultivable |
| 26+375 | 26+575 | 200 | Barren | Barren |
| 26+575 | 27+250 | 675 | Forest | Forest |
| 27+250 | 27+850 | 600 | Bushes | Bushes |
| 27+850 | 28+900 | 1,050 | Barren | Barren |
| 28+900 | 29+250 | 350 | Bushes | Bushes |
| 29+250 | 29+500 | 250 | Barren | Barren |
| 29+500 | 29+675 | 175 | Cultivable | Cultivable |
| 29+675 | 30+000 | 325 | Barren | Barren |
| 30+000 | 30+400 | 400 | Bushes | Bushes |
| 30+400 | 30+800 | 400 | Forest | Forest |
| 30+800 | 31+050 | 250 | Barren | Barren |
| 31+050 | 31+200 | 150 | Settlement | Settlement |
| 31+200 | 31+250 | 50 | Forest | Cultivable |
| 31+250 | 31+300 | 50 | Forest | Settlement |
| 31+300 | 31+675 | 375 | Forest | Cultivable |
| 31+675 | 31+750 | 75 | Barren Land | Settlement |
| 31+750 | 31+800 | 50 | Settlement | Settlement |
| 31+800 | 31+975 | 175 | Cultivable | Forest |
| 31+975 | 32+025 | 50 | Cultivable | Settlement |
| 32+025 | 32+200 | 175 | Forest | Settlement |
| 32+200 | 32+325 | 125 | Forest | Forest |
| 32+325 | 32+425 | 100 | Cultivable | Cultivable |
| 32+425 | 32+525 | 100 | Settlement | Settlement |
| 32+525 | 32+575 | 50 | Cultivable | Cultivable |
| 32+575 | 32+625 | 50 | Settlement | Cultivable |
| 32+625 | 32+775 | 150 | Cultivable | Cultivable |
| 32+775 | 32+825 | 50 | Cultivable | Settlement |
| 32+825 | 33+200 | 375 | Cultivable | Cultivable |
| 33+200 | 33+275 | 75 | Private Forest | Bushes |
| 33+275 | 33+350 | 75 | Cultivable | Bushes |
| 33+350 | 33+550 | 200 | Bushes | Bushes |
| 33+550 | 33+650 | 100 | Settlement | Settlement |
| 33+650 | 33+750 | 100 | Cultivable | Bushes |

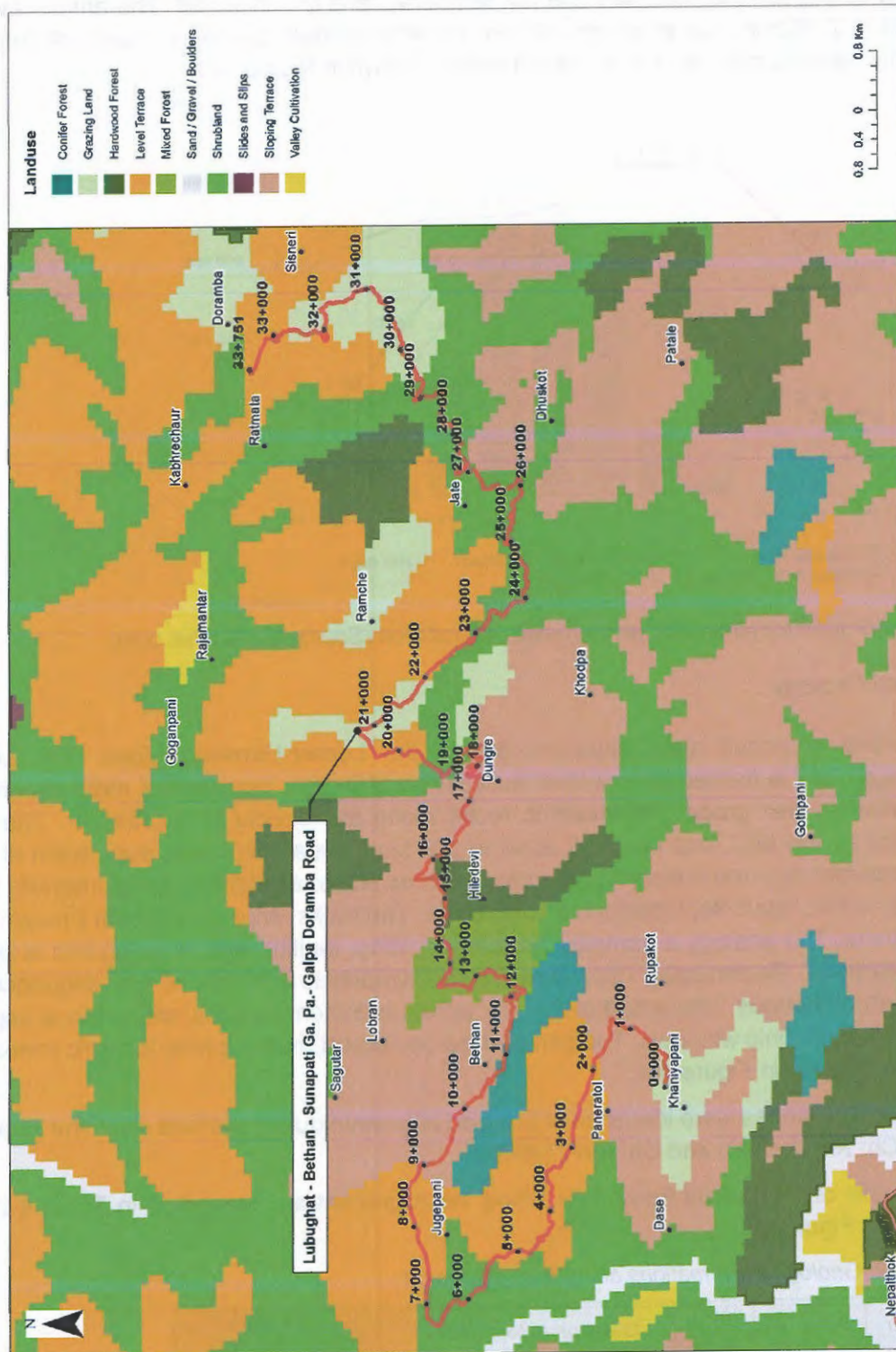
Source: Field visit, 2022 (Drone Imagery captured during detailing engineering survey data)





(Source: Department of Survey)

Figure 4-1: Road Alignment Landcover map



(Source: Department of Survey)

Figure 4-2: Road Alignment land use map

4.1.3 Hydrology and Meteorology/Climate

The climate of the subproject site is sub-tropical. The average high temperature of the area is 33°C during summer and average low temperature is 6°C in winter. The annual average rainfall is 2,703mm out of which 823mm (30.4%) rainfall occurs in month of July. The monthly mean-temperature and precipitation is shown in Figure 4-3.

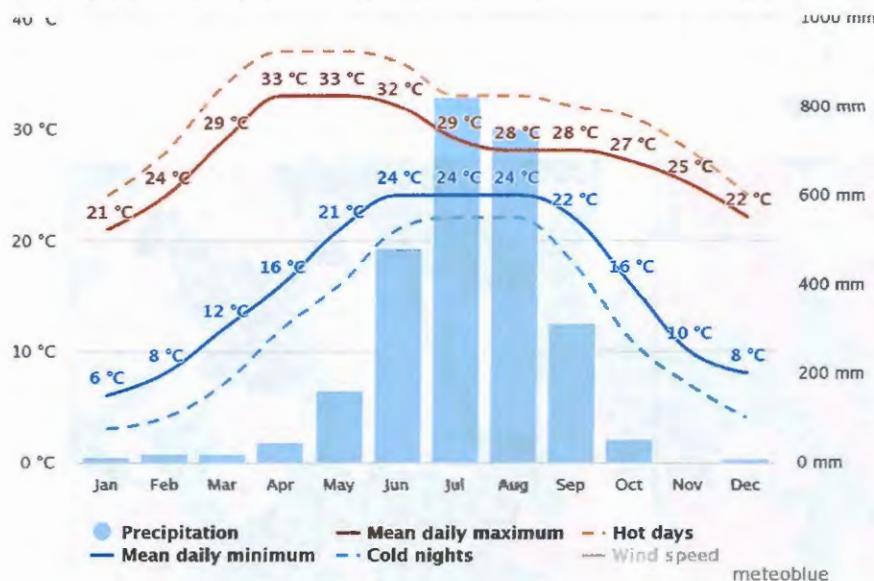


Figure 4-3: Monthly Mean-Temperature and Precipitation (Source: Meteoblue.com)

4.1.4 Soil and Geology

The entire proposed road alignment lies in the Lesser-Himalaya Zone. The Lesser Himalayan belt is formed from a thick succession of largely fossiliferous meta-sediments, supporting higher grade metamorphic rocks along the structural depression. The belt, delimited by the MBT and the MCT is 60 to 100 km wide and includes over 30km of thick meta-sedimentary and metamorphic rocks; such as shale, sandstone, conglomerate, slate, phyllite, schist, quartzite, limestone and dolomite. The rocks range in age from Precambrian to Miocene. The geology is complicated due to folding, faulting and thrusting and is largely unfossiliferous. Tectonically, the entire Lesser Himalayas consists of two sequences of rocks: allochthonous, and autochthonous – paraautochthonous units; with various nappes, klippe and tectonic windows. The generalized geological map showing tectonic zones and thrusts is shown in Figure 4-4.

Two unstable slopes were identified in the road alignment during the field visit. The locations are at Ch. Km (3+300) and Ch. Km (7+500).

The details of Geological formations along the alignment are presented in Table 4-2 and alignment Figure.

Table 4-2: Geological Formations along road alignment

| From | To | Length (m) | Geological formation | Percentage of Alignment |
|--------|--------|------------|----------------------|-------------------------|
| 0+000 | 24+630 | 24,630 | Ranimatta Formation | 72.98% |
| 24+630 | 26+980 | 2,350 | Naudanda Formation | 6.96% |

| From | To | Length (m) | Geological formation | Percentage of Alignment |
|--------|--------|------------|------------------------|-------------------------|
| 26+980 | 29+530 | 2,550 | Ghanapokhara Formation | 7.56% |
| 29+530 | 30+140 | 610 | Cr | 1.81% |
| 30+140 | 33+640 | 3,500 | Ghanapokhara Formation | 10.37% |
| 33+640 | 33+751 | 111 | Cr | 0.33% |

Source: Detailed Project Report for Lubhughat – Galpa – Doramba Road, 2022

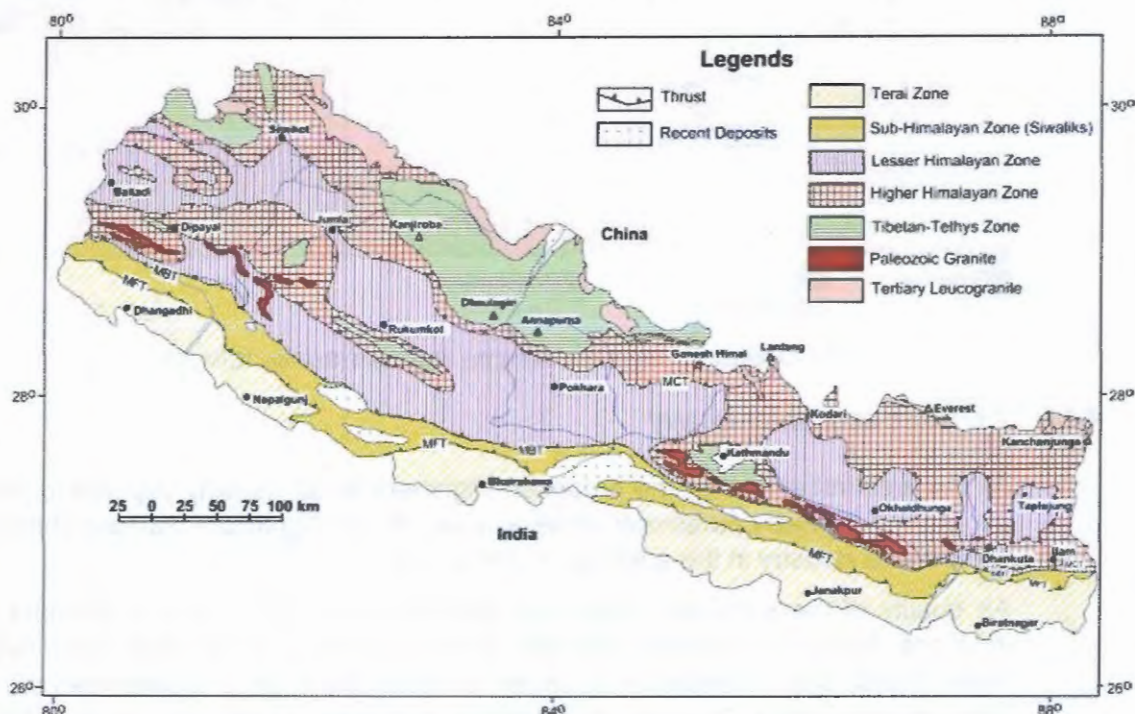


Figure 4-4: Geological Map of Nepal

Source: Dahal, Dr. R.K , 2006. Geology of Nepal.

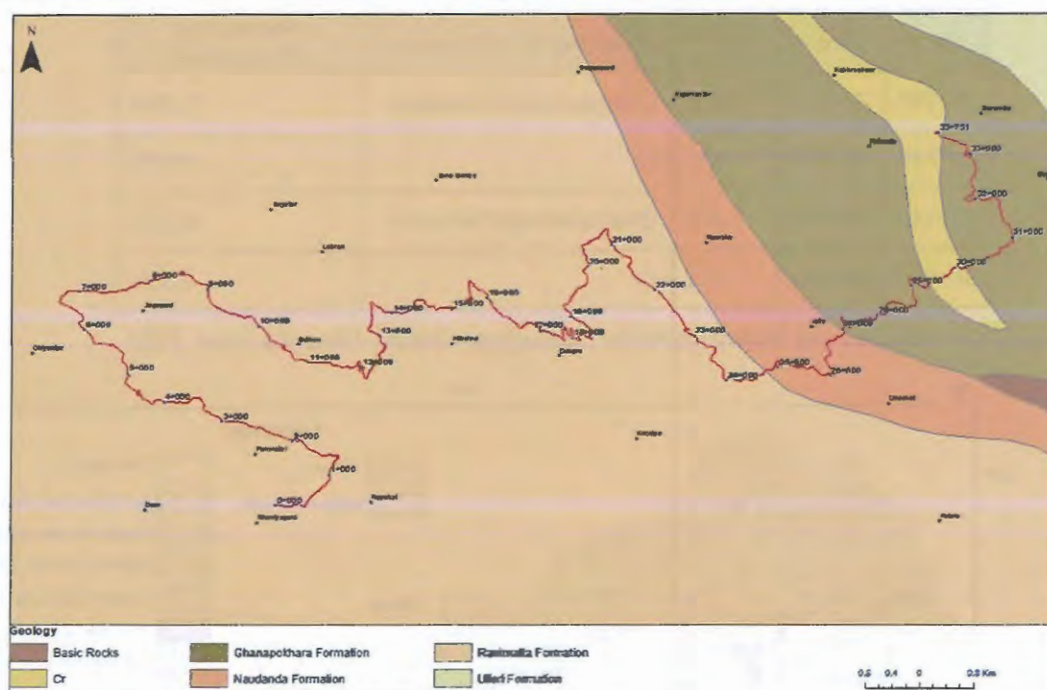


Figure 4-5: Geological Formations along the alignment (Source: ICIMOD)

4.1.5 Air, Noise and Water Quality

As the area influenced by the proposed alignment is not densely populated, the observed air and water quality parameter value was found fair. Significant sources of noise *such as* vehicle and industry in the area was not observed. +

Air quality of the subproject area was determined using Air Quality Detector at various locations. Noise level of the subproject area was measured by noise level meter and for water quality, water samples from stream sources where the proposed road crosses, were collected and tested. The reference table for Air Quality is tabulated below in Table 4-3.

During field visit on February, 2022, The total suspended particles PM_{2.5} is found to be 29.5 to 65.4 $\mu\text{g}/\text{m}^3$. Five settlement areas have PM_{2.5} greater than allowable limit (40 $\mu\text{g}/\text{m}^3$). Similarly, PM₁₀ is within the allowable limit (120 $\mu\text{g}/\text{m}^3$).

Table 4-3: Air Quality Parameter for Reference

| Parameter | Unit | Time | Max. | Method of Measurement |
|--|--------------------------|------------------|-----------------------|--|
| | | Weighted Average | Concn. in Ambient Air | |
| TSP | $\mu\text{g}/\text{m}^3$ | Annual | | High Volume Sampling and Gravimetric Analysis |
| | | 24-hour* | 230 | |
| PM ₁₀ | $\mu\text{g}/\text{m}^3$ | Annual | | High Volume Sampler and Gravimetric Analysis, TOEM, Beta Attenuation |
| | | 24-hour | 120 | |
| PM _{2.5} | $\mu\text{g}/\text{m}^3$ | Annual | | Sampling Gravimetric Matrix |
| | | 24-hour* | 40 | |
| Oxides of Nitrogen (as NO ₂) | $\mu\text{g}/\text{m}^3$ | Annual | 40 | Cheiluminescence |
| | | 24-Hour* | 80 | Same as manual |
| | | Annual | 50 | |

| Parameter | Unit | Time | Max. | Method of Measurement |
|-----------------------------------|-------------------|------------------|-----------------------|---|
| | | Weighted Average | Concn. in Ambient Air | |
| Sulfur Dioxide (SO ₂) | µg/m ³ | 24-Hour** | 70 | Ultraviolet Fluorescence method, West and Gaeke Method |
| | | 1-Hour | | |
| Ozone (O ₃) | µg/m ³ | 24-hour | | UV spectrophotometer |
| | | 8-Hour* | 157 | |
| Carbon Monoxide (CO) | mg/m ³ | 8-hour* | 10,000 | Non-Dispersive Infra-Red (NDIR) method |
| | | 1-Hour | | |
| | | 15-minute | 100 | |
| Lead (Pb) | µg/m ³ | Annual** | 0.5 | High volume sampling followed by atomic absorption spectrometry |
| | | 24-Hour | | |
| Benzene | µg/m ³ | Annual ** | 5 | Gas Chromatographic |

Source: National Ambient Air Quality Standard for Particle Pollution, 2012

Observed data on air and sound quality are illustrated in the tables below:

Table 4-4: Air Quality Data

| S.N. | Location | Chainage | PM _{2.5} (µg/m ³) | PM ₁₀ (µg/m ³) | Particles (Per L) | CO ₂ (ppm) | HCHO (mg/m ³) |
|------|-------------|----------|---|--|----------------------|--------------------------|------------------------------|
| 1 | Katunje | 0+270 | 65.4 | 100.5 | 7126 | 693 | 0.016 |
| 2 | Bhosa | 3+330 | 49.2 | 74.7 | 5211 | 646 | 0.020 |
| 3 | Dahoo | 6+880 | 51.9 | 78.6 | 6049 | 698 | 0.034 |
| 4 | Valwadi | 8+150 | 31.5 | 49.2 | 3897 | 577 | 0.017 |
| 5 | Bethan | 10+050 | 30.1 | 48.6 | 4062 | 540 | 0.025 |
| 6 | Sadi | 15+500 | 42.0 | 65.6 | 3513 | 602 | 0.028 |
| 7 | Kama | 19+730 | 31.2 | 48.3 | 3411 | 579 | 0.023 |
| 8 | Dimipokhari | 21+700 | 29.5 | 44.7 | 3192 | 568 | 0.026 |
| 9 | Galpa | 25+050 | 37.1 | 57.4 | 3873 | 587 | 0.023 |
| 10 | Doramba | 31+750 | 39.9 | 61.3 | 3979 | 592 | 0.023 |
| 11 | Bodal Dada | 33+620 | 48.3 | 75.3 | 4665 | 588 | 0.025 |

Source: Field Observation, 2022

Since the area is sparsely populated, noise is insignificant from the settlements as well. The average level of noise in the subproject area is 32.8 dB Which is within the threshold limit (45 dB) for the rural residential area.

Table 4-5: Sound Quality Data

| S.N. | Location | Chainage | Minimum Sound (dB) | Average Sound (dB) | Maximum Sound (dB) |
|------|----------|----------|--------------------|--------------------|--------------------|
| 1 | Katunje | 0+270 | 12.6 | 21.5 | 37.4 |
| 2 | Bhosa | 3+330 | 15.7 | 28.5 | 55.8 |
| 3 | Dahoo | 6+880 | 30.2 | 41.1 | 51.1 |
| 4 | Valwadi | 8+150 | 22.5 | 35.1 | 60.2 |
| 5 | Bethan | 10+050 | 33.1 | 45.5 | 58.9 |
| 6 | Sadi | 15+500 | 27.5 | 40.2 | 66.8 |
| 7 | Kama | 19+730 | 2.5 | 10.5 | 54.5 |

| S.N. | Location | Chainage | Minimum Sound (dB) | Average Sound (dB) | Maximum Sound (dB) |
|------|-------------|----------|--------------------|--------------------|--------------------|
| 8 | Dimipokhari | 21+700 | 18.9 | 29.5 | 53.2 |
| 9 | Galpa | 25+050 | 21.6 | 40.8 | 60.5 |
| 10 | Doramba | 31+750 | 23.2 | 45.5 | 53.6 |
| 11 | Bodal Dada | 33+620 | 2.3 | 22.5 | 40.0 |

Source: Field Observation, 2022

For testing water pollution, water sample from 4 sources were tested. Out of which 3 samples were found slightly acidic with pH value 6-6.5 and 1 sample was basic with pH value 7.5. An average of 62.72 mg/L of chloride was observed. Further, average nitrate of 22.5 mg/L was observed of the four samples. Chemicals like Iron, Ammonia, Phosphate, and Residual chlorine was not observed in any samples. The samples were also tested for coliform and no coliform was observed in any samples.

Table 4-6: Water Quality Data

| Category | Parameters | Sample 1 | Sample 2 | Sample 3 | Sample 4 |
|-----------------|-----------------------------|----------|----------|----------|----------|
| Physical | pH (-) | 6 | 6.5 | 6.5 | 7.5 |
| Chemical | Iron (mg/L) | 0 | 0 | 0 | 0 |
| | Ammonia (mg/L) | 0 | 0 | 0 | 0 |
| | Chloride (mg/L) | 62.72 | 54.88 | 62.72 | 70.56 |
| | Phosphate (mg/L) | 0 | 0 | 0 | 0 |
| | Nitrate (mg/L) | 25 | 10 | 50 | 5 |
| | Total Hardness (mg/L) | 96 | 80 | 80 | 64 |
| | Residual Chlorine (mg/L) | 0 | 0 | 0 | 0 |
| Microbiological | Total Coliform (cfu/100 ml) | NO | NO | NO | NO |

Source: Field Observation, 2022

The location map of observed air quality, noise level and water sample collected are shown below:



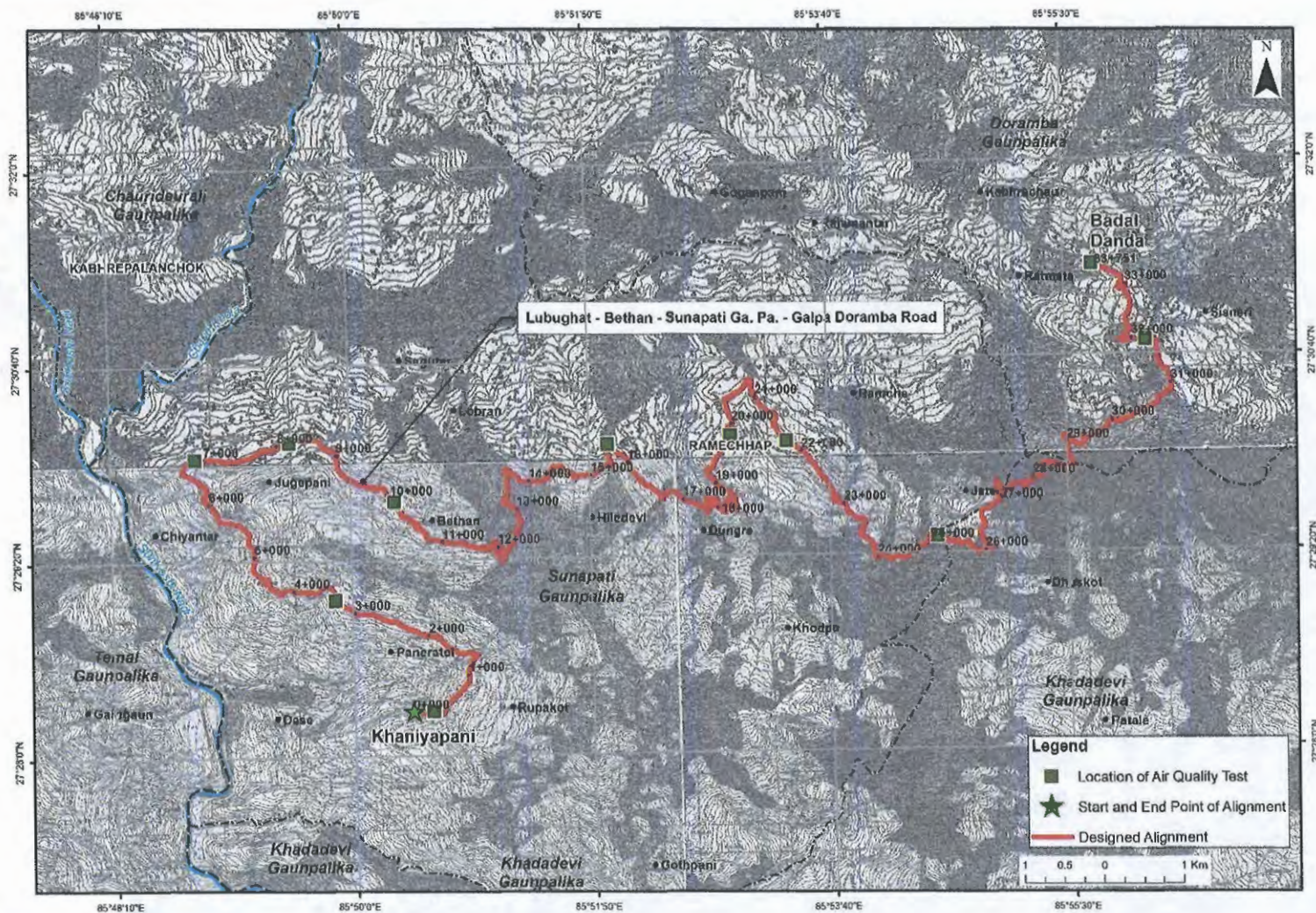


Figure 4-6: Location of Air Quality Sample taken along the alignment (Source: Department of Survey)

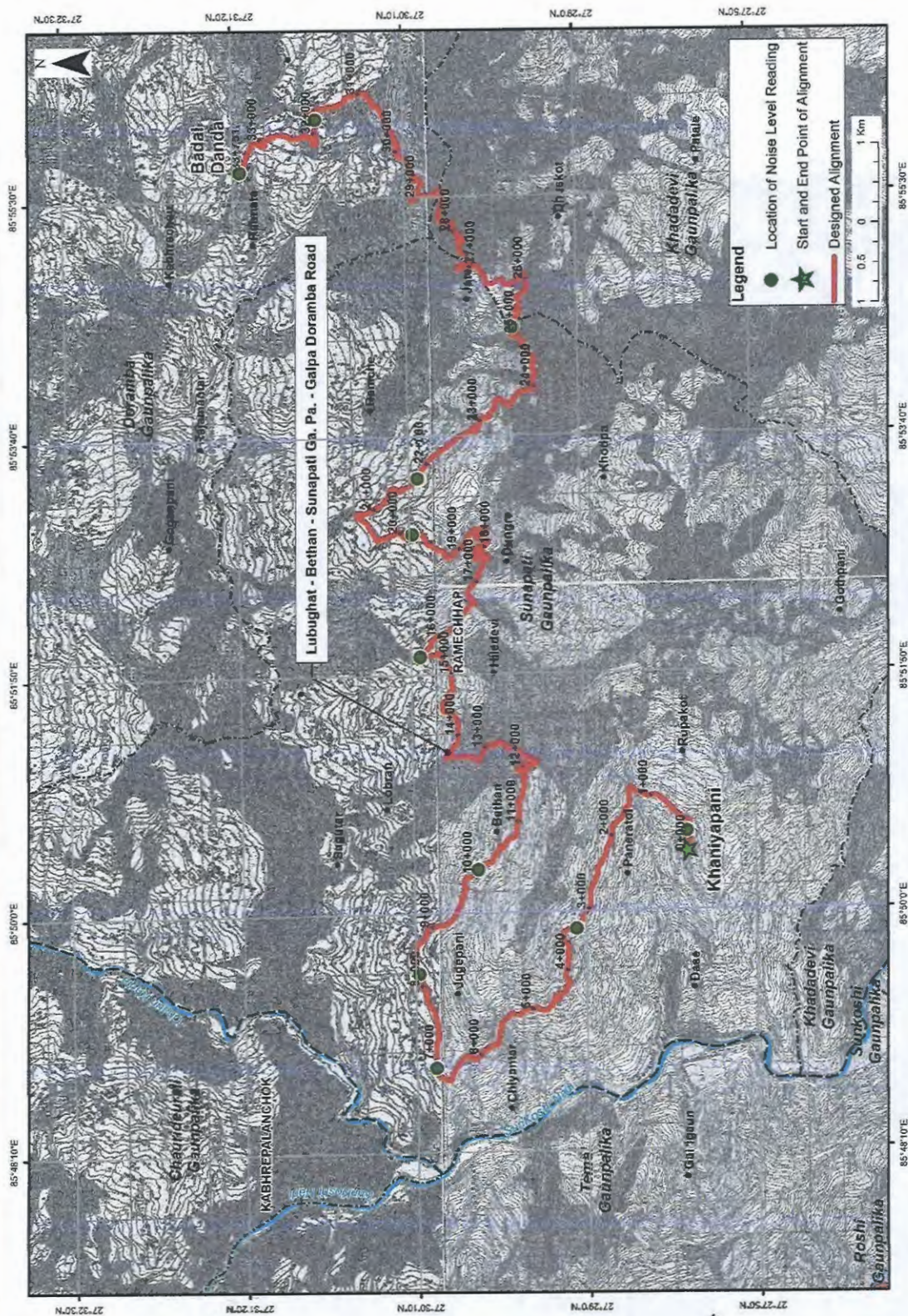


Figure 4-7: Location of Noise Level Reading taken along the alignment (Source: Department of Survey)

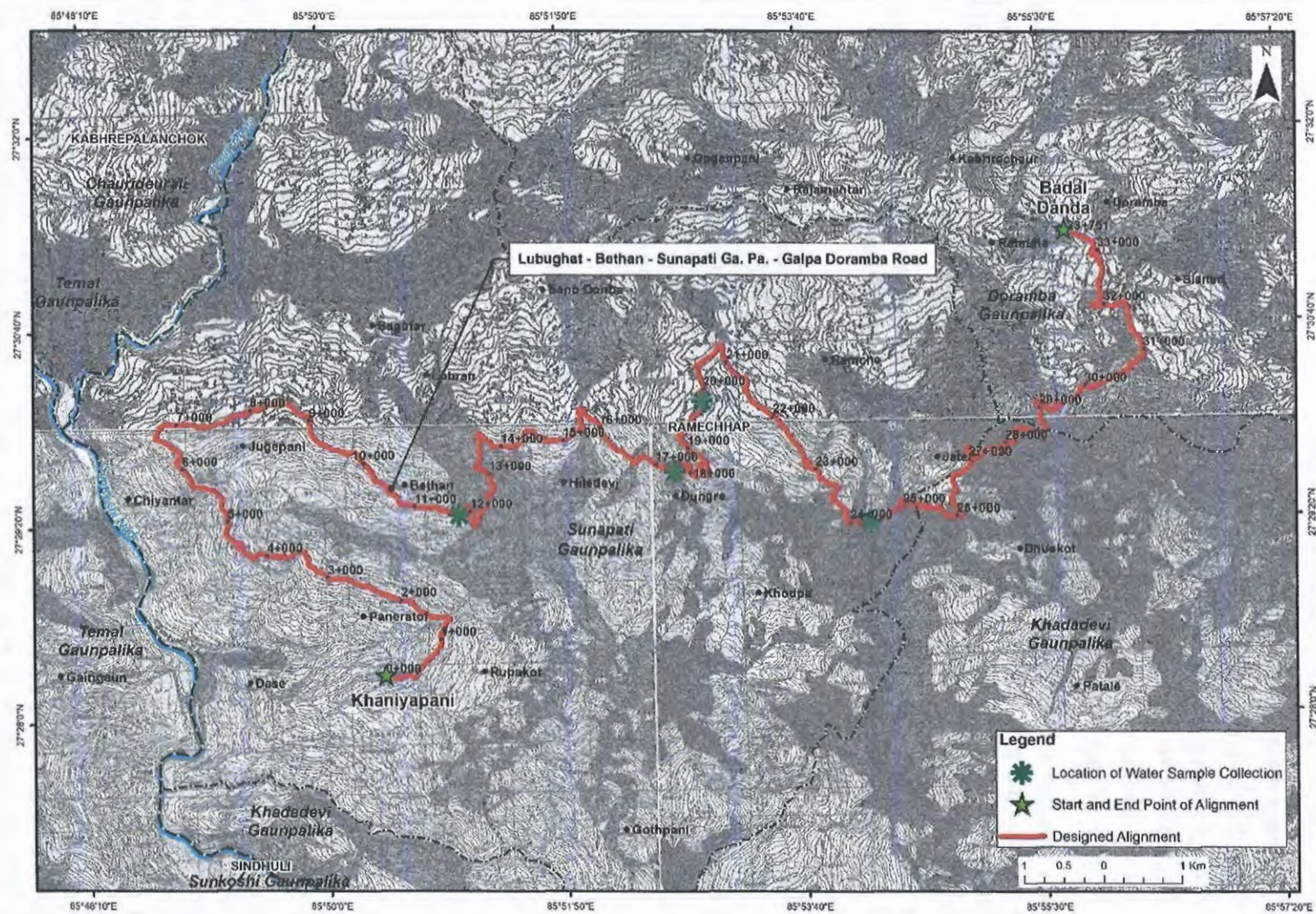


Figure 4-8: Location of Water Sample collected along the alignment

(Source: Department of Survey)

4.1.6 Construction Materials

A brief material availability survey was conducted for record. The materials required for an upgrading or improvement road subproject are:

- Sub-base material (gravel)
- Base coarse aggregate
- Road surfacing aggregate
- Aggregates for structural concrete
- Filter/drainage material
- Boulder or rock-fill for gabion baskets.

Survey was carried out to find out the potential sources of construction materials. Most of the sources are located in the vicinity of the subproject road. The survey for sources of potential materials mostly concentrated in construction materials for sub-base, aggregates, sand and concrete aggregates to be used in proposed road construction.

The potential sources of material selected for the road alignment is presented in Table 4-7. The map for the location of construction materials is presented in Appendix 3.

Table 4-7: Potential Sources of Material

| SN | Name of the Source | Locations | Estimated Quantity | Estimated Extractable Quantities (m ³) during construction period | | | |
|----|-------------------------|--|--------------------|---|-----------|--------|---------|
| | | Chainage/ | | Boulder/ Stone | Aggregate | Sand | Total |
| | | Co-ordinates | (cum) | (cum) | (cum) | (Cum) | (Cum) |
| 1 | Sunkoshi River | Sunkoshi River (12 Km from Start Point) Latitude: 27°25'22" N Longitude: 85°51'33" E | 6,650 | 1,995 | 3,990 | 665 | 6,650 |
| 2 | Kamalamai Baluwa Udhyog | Sunkoshi River Latitude: 27°25'43" N Longitude: 85°50'28" E | 100,000 | 48,606 | 97,211 | 16,202 | 162,019 |
| 3 | Bhimdutta Crusher | Roshi Khola Latitude: 27°26'38" N Longitude: 85°46'59" E | 111,395 | 30,931 | 61,862 | 10,310 | 103,103 |
| | | | 218,045 | 81,532 | 163,063 | 27,177 | 271,772 |

Source: Detailed Project Report for Upgrading of Lubhughat – Galpa – Doramba Road, 2022

The potential source identified for extracting construction materials has sufficient quantity required for the subproject. So, construction materials may not be required from any other source for this subproject. The sufficient quantity will be available in the Sunkoshi River and other private crusher (Kamalamai Baluwa Udhyog and Bhimdutta Crusher). If the quality and quantity of the material did not match with the estimation while implementing the proposal, the contractor has to find the new sources and prepare the plan with best mitigation measures and approved from the Construction Supervision Consultant (CSC) and concerned local bodies before implementation. The equipment and vehicles required for the extraction of construction materials are excavators, bulldozers, loaders, tippers, trucks, tractors, shovel, screen plant, etc.

4.2 Biological Environment

The subproject area lies within mix settlement and agricultural area with high human influence.

The alignment passes through different community forest namely Sunapati Salleni Community Forest, Sunapati Sarvajhang Kiprug Community Forest, Phalam Pokhari Community Forest, Chandramukhi Community Forest, Suryamukhi Community Forest, Gairi Danda Kabulyat Forest, Ratmate Community Forest, Gothe Danda Karyangmaryang Community Forest, Jhopsing Khola Kabulyat Forest, Bhumithan Community Forest. The alignment also passes through private forest from 33+100 to 33+750.

4.2.1 Flora

The dominant forest type existing along the alignment is Salla. They are used for timbers, fuel wood, fodder, litter, wild fruits, and other NTFPs purposes. The dominant tree species reported within the subproject area and road alignment are Salla (*Pinus wallichiana*), Uttis (*Alnus nepalensis*) and Chilaune (*Schima wallichii*). The other tree species are Paiyu (*Prunus sarasoides*), Lakuri (*Fraxinus floribunda*), Kutmiro (*Litsea polyantha*), Katus (*Castanopsis indica*), Khirra (*Falconeria insignis*), Malgedi (*Cinnamomum glaucescens*), etc.

Total 37 species of trees are affected by the road upgradation. Under IUCN Red List of Threatened Species: 21 species (373 trees) fall under "Least Concern"; 1 species (4 trees) in "Near Threaten" and 15 species (74 trees) in not listed category. Under GoN Protection categories: 1 species (5 trees) falls under "Banned for Export, 1 species (1 tree) in "Banned for Felling, Transportation or Export" and 1 species (1 tree) in "Non-Endemic Threatened Plants" in the protection list of Government of Nepal. None of the species are listed under CITES.

The tree species recorded during IEE field Visit are presented in appendix 13.

The conservation status of the affected

Table 4-8: Status of Flora listed in IUCN, CITES and Nepal Government Protection Category

| SN | Scientific Name | Local Name | IUCN | GoN | Cites | Nos |
|----|-------------------------------|------------|------|-----|-------|-----|
| 1 | <i>Pinus wallichiana</i> | Salla | LC | NL | NL | 155 |
| 2 | <i>Alnus nepalensis</i> | Uttis | LC | NL | NL | 117 |
| 3 | <i>Schima wallichii</i> | Chilaune | LC | NL | NL | 44 |
| 4 | <i>Prunus sarasoides</i> | Paiyu | NL | NL | NL | 19 |
| 5 | <i>Fraxinus floribunda</i> | Lakuri | LC | NL | NL | 14 |
| 6 | <i>Litsea polyantha</i> | Kutmiro | NL | NL | NL | 13 |
| 7 | <i>Ficus nerifolia</i> | Dudhilo | NL | NL | NL | 11 |
| 8 | <i>Castanopsis indica</i> | Katus | LC | NL | NL | 8 |
| 9 | <i>Magnifera indica</i> | Aap | NL | NL | NL | 5 |
| 10 | <i>Cinnamomum glaucescens</i> | Malgedi | LC | BE | NL | 5 |
| 11 | <i>Grewia sclerophylla</i> | Pharsa | NL | NL | NL | 5 |
| 12 | <i>Madhuca latifolia</i> | Mauwa | NL | NL | NL | 4 |
| 13 | <i>Ficus semicordata</i> | Khaniyo | LC | NL | NL | 4 |
| 14 | <i>Ficus sarmentosa</i> | Timila | LC | NL | NL | 4 |

| SN | Scientific Name | Local Name | IUCN | GoN | Cites | Nos |
|--|---------------------------------|-------------|------|------|-------|-----|
| 15 | <i>Rhododendron arboreum</i> | Guras | LC | NL | NL | 4 |
| 16 | <i>Falconeria insignis</i> | Khirro | NL | NL | NL | 4 |
| 17 | <i>Cryptomeria japonica</i> | Dhupi | NT | NL | NL | 4 |
| 18 | <i>Quercus lanata</i> | Phalat | LC | NL | NL | 3 |
| 19 | <i>Lyonia villosa</i> | Angeri | LC | NL | NL | 3 |
| 20 | <i>Ichnocarpus frutescens</i> | Dudhe | NL | NL | NL | 3 |
| 21 | <i>Hymenodictyon flaccidum</i> | Laati karam | NL | NL | NL | 2 |
| 22 | <i>Aesendra butyraceae</i> | Chiuri | NL | NL | NL | 2 |
| 23 | <i>Lagerstroemia parviflora</i> | Hade | LC | NL | NL | 2 |
| 24 | <i>Pyrus pyrifolia</i> | Naspati | NL | NL | NL | 2 |
| 25 | <i>Bauhinia purpurea</i> | Koirala | LC | NL | NL | 2 |
| 26 | <i>Ficus glaberrima</i> | Pakhauri | LC | NL | NL | 1 |
| 27 | <i>Leucaena leucocephala</i> | Eepil | NL | NL | NL | 1 |
| 28 | <i>Capillipedium assimile</i> | Khari | NL | NL | NL | 1 |
| 29 | <i>Melia azedarach</i> | Bakaino | LC | NL | NL | 1 |
| 30 | <i>Albizia procera</i> | Siris | LC | NL | NL | 1 |
| 31 | <i>Syzygium cumini</i> | Jamun | LC | NL | NL | 1 |
| 32 | <i>Shorea robusta</i> | Sal | LC | BFTE | NL | 1 |
| 33 | <i>Elaeocarpus ganitrus</i> | Rudrachhya | NL | NL | NL | 1 |
| 34 | <i>Choerospondias axillaris</i> | Lapsi | LC | NETP | NL | 1 |
| 35 | <i>Citrus sinensis</i> | Junar | NL | NL | NL | 1 |
| 36 | <i>Semecarpus anacardium</i> | Bhalayo | LC | NL | NL | 1 |
| 37 | <i>Pyrus pashia</i> | mail | LC | NL | NL | 1 |
| Note: LC – Least Concern NL – Not Listed NT – Nearly Threaten NETP – Non-Endemic Threatened Plant BFTE-Banned for Felling, Transportation or Export BE – Banned for Export | | | | | | |

(Source: Source: IUCN Redlist of Threatened Species, Checklist of CITES Species, Floraofnepal.org)

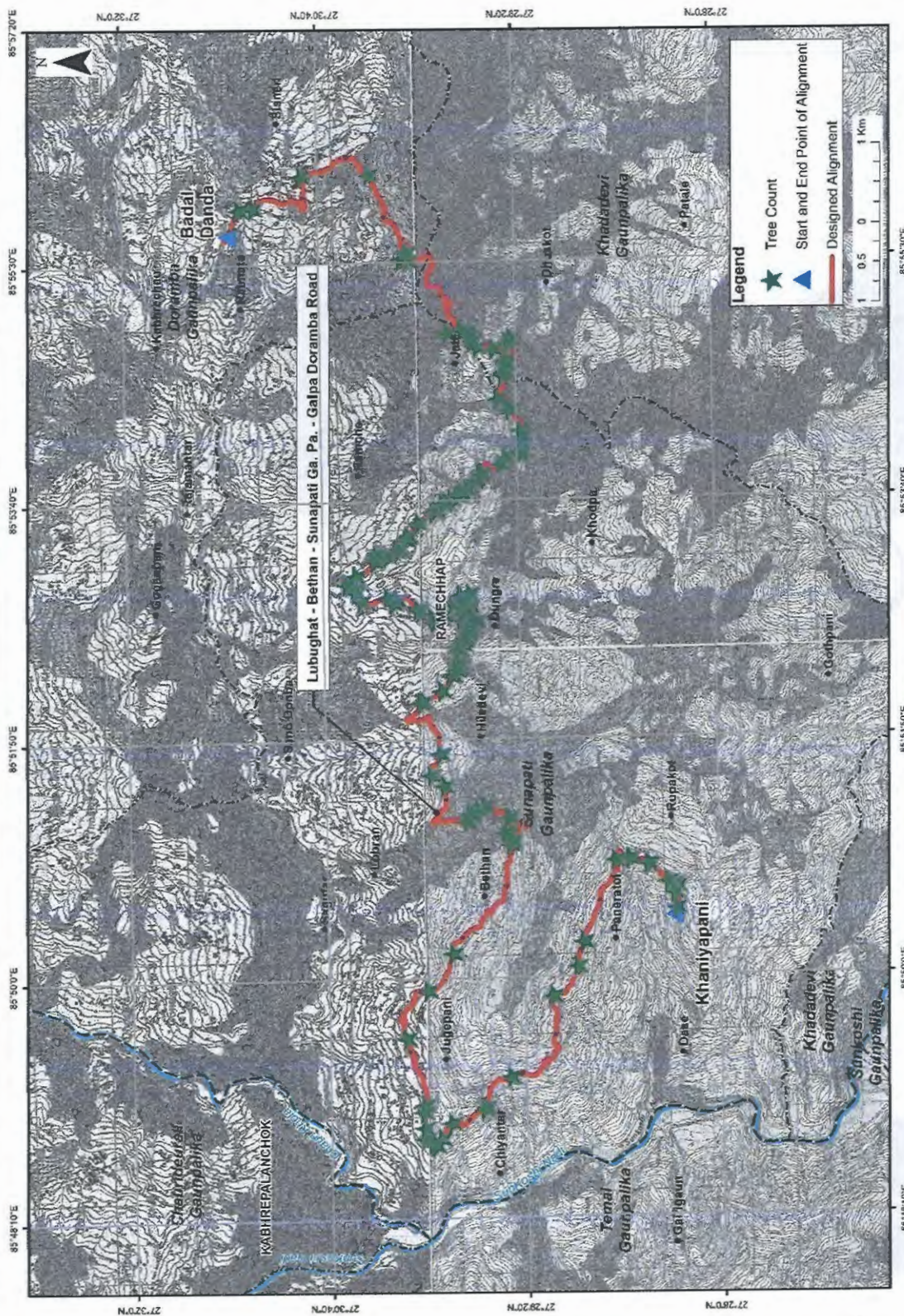


Figure 4-9: Location of recorded trees within road alignment (Source: Department of Survey)

Ministry of Local Government, Rural Development and Works
 Department of Local Infrastructure
 Rural Community Improvement Project (R-CIP)
 Project Coordination Unit
 Lalitpur



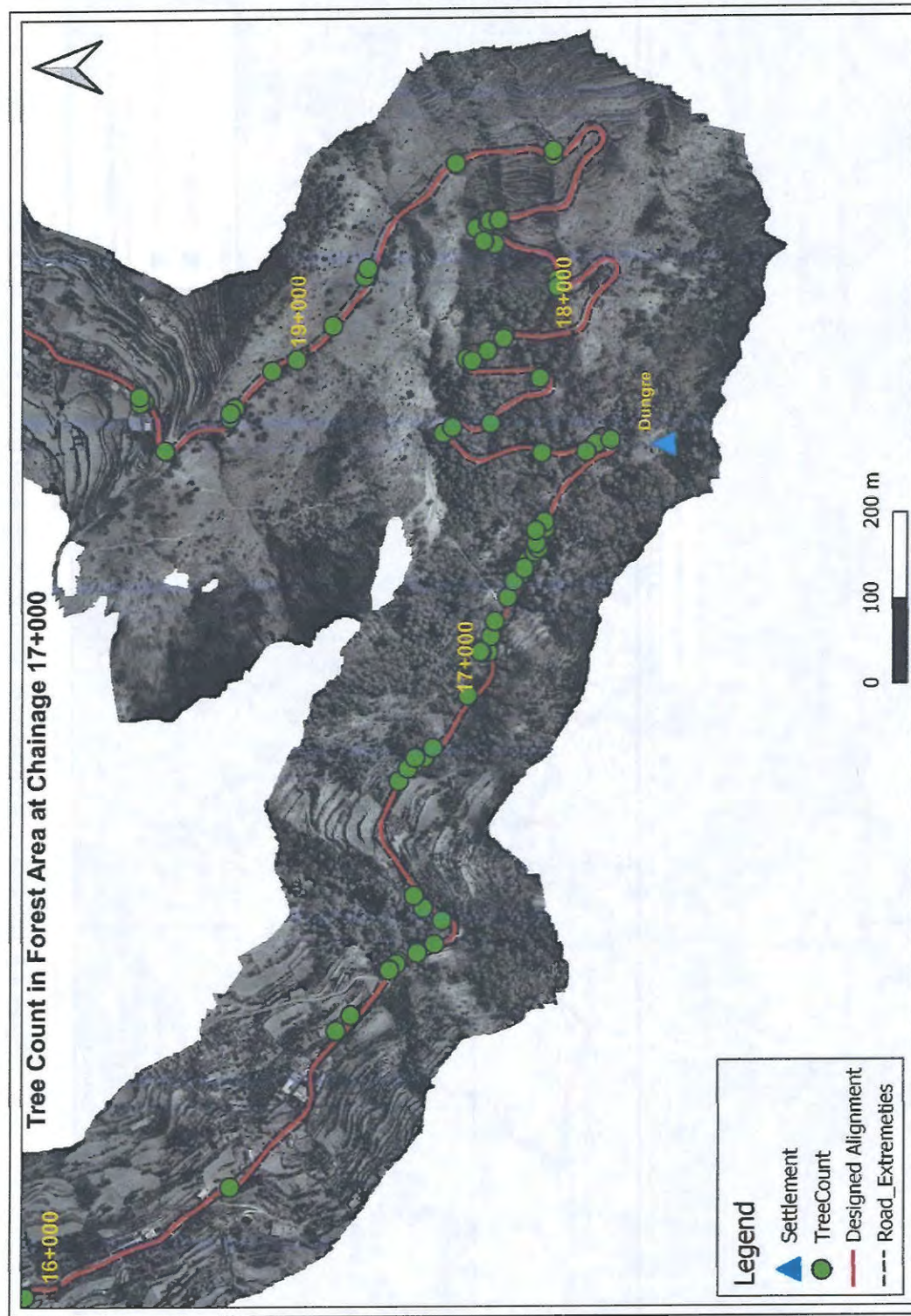


Figure 4-10: Location of recorded trees within road alignment at Chainage 16+000-19+000

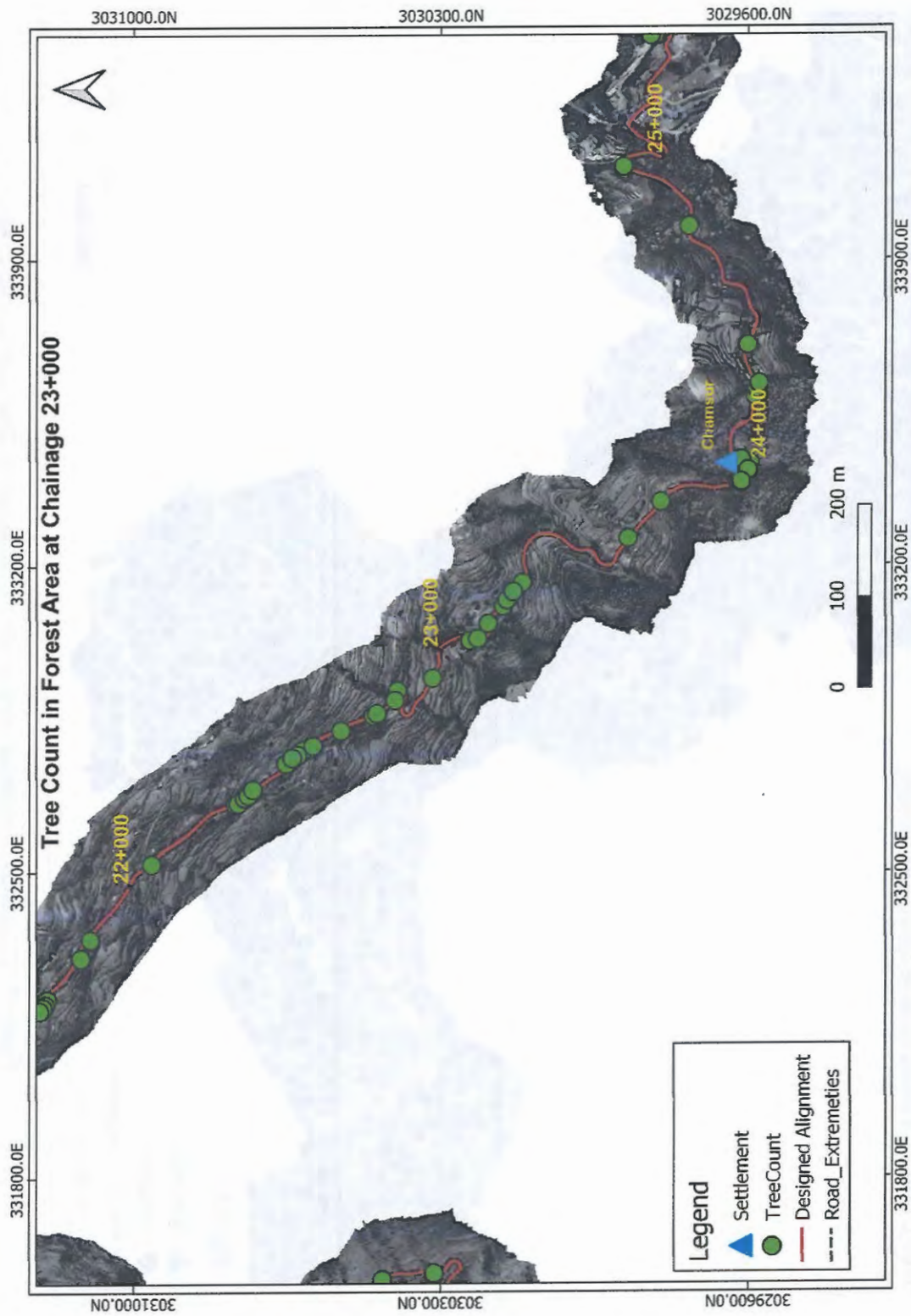


Figure 4-11: Location of recorded trees within road alignment at Chainage 21+000-25+000

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 Department of Infrastructure
 Rural Connectivity and Improvement Project (RCIP)
 Project Coordination Unit
 Lalitpur



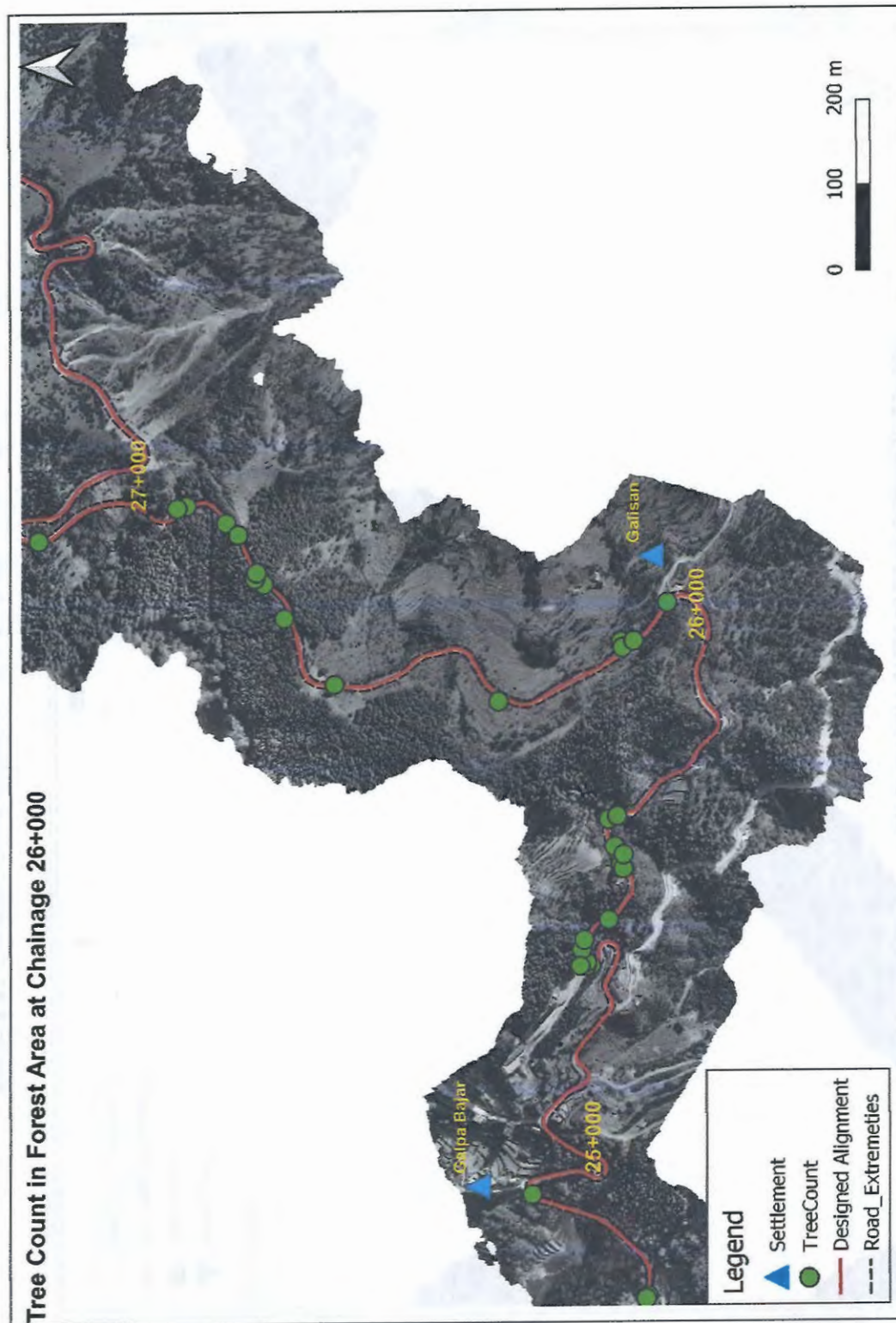


Figure 4-12: Location of recorded trees within road alignment at Chainage 25+000-27+000

4.2.2 Fauna

According to locals, the presence of wild animals and their movement in this area is low. Animals like Chari Bagh (*Felis bengalensis*), Jungle cat (*Felis chaus*), Monkey (*Macaca mulatta*), Langur (*Semnopithecus hector*), Bandel (*Sus scrofa*), Hare (*Lepus nigricollis*), Jackal (*Canis aureus*), Dumsi (*Hystrix indica*), Mriga (*Muntiacus vaginalis*) etc. are observed occasionally near the water bodies within the subproject district. The subproject road is the upgrading of existing road and cross drainage structures hence, it will not disturb wild animal passing. The proposed bridges and culverts will be wild life friendly structure with adequate clearance beneath the bridge for animal to see the other side.

Similarly, Kalij (*Lophura leucomelana*), Dhukur (*Streptopelia chinensis*), Bhangera (*Passer domesticus*), Dangre (*Acridotheres tristis*), Crow (*Corvus splendens*), Koili (*Eudynamys scolopaceus*), Kite (*Milvus migrans*), Sarau (*Sturnus spp.*) etc. are the birds found along the road alignment and forest area of the influenced zone.

The protection status of the fauna in the sub- area are tabulated below in Table 4-9

Table 4-9: Status of Fauna Species Listed in IUCN, CITES and GoN Protection Categories

| S.N. | Local Name | Scientific Name | IUCN | CITES | GoN |
|---|--------------------|--------------------------------|---------------|--------------|------------|
| 1 | Barking Deer | <i>Muntiacus muntjak</i> | Decreasing/LC | Not Listed | Not Listed |
| 2 | Wild Boar | <i>Sus scrofa</i> | Unknown/LC | Not Listed | Not Listed |
| 3 | Monkey | <i>Macaca Assamensis</i> | Decreasing/NT | Appendix II | Protected |
| 4 | Red Monkey | <i>Macaca mulatta</i> | Unknown/LC | Appendix II | Not Listed |
| 5 | Malsapro | <i>Martes flavigula</i> | Decreasing/LC | Appendix III | Not Listed |
| 6 | Common Leopard | <i>Panthera Pardus</i> | Decreasing/VU | Appendix I | Not Listed |
| 7 | Wild cat | <i>Felis silvestris</i> | Decreasing/LC | Appendix II | Not Listed |
| 8 | Indian fox | <i>Vulpes bengalensis</i> | Decreasing/LC | Appendix III | Not Listed |
| 9 | Hispid Hare | <i>Caprolagus hispidus</i> | Decreasing/EN | Appendix I | Protected |
| 10 | Squirrel | <i>Sciuridae sp</i> | Not Listed | Not Listed | Not Listed |
| 11 | Common Mongoose | <i>Herpestes edwardsi</i> | Stable/LC | Appendix III | Not Listed |
| 12 | Sparrow | <i>Passer domesticus</i> | Decreasing/LC | Not Listed | Not Listed |
| 13 | Barn Owl | <i>Tyto alba</i> | Stable/LC | Appendix II | Not Listed |
| 14 | Crow | <i>Corvus splendens</i> | Stable/LC | Not Listed | Not Listed |
| 15 | Asian Koel | <i>Eudynamys scolopaceus</i> | Stable/LC | Not Listed | Not Listed |
| 16 | Jungle Fowl | <i>Gallus</i> | Decreasing/LC | Not Listed | Not Listed |
| 17 | Bengal florican | <i>Houbaropsis bengalensis</i> | Decreasing/CR | Appendix I | Protected |
| 18 | Black Stork | <i>Ciconia nigra</i> | Unknown/LC-MD | Appendix II | Protected |
| 19 | White Stork | <i>Ciconia</i> | Increasing/LC | Not Listed | Protected |
| 20 | Gaint hornbill | <i>Buceros bicornis</i> | Decreasing/VU | Appendix I | Protected |
| 21 | Cattle egret | <i>Bubulcus ibis</i> | Increasing/LC | Not Listed | Not Listed |
| 22 | Indian Jungle crow | <i>Corvus macrorhynchos</i> | Stable/LC | Not Listed | Not Listed |
| CR-Critically Endangered DD- Data Deficient EN-Endangered LC- Least Concern MD-Moderately Declined NT- Near Threatened VU- Vulnerable Source: IUCN Redlist, Checklist of CITES Species, dnpwc.gov.np | | | | | |

Source: IUCN Red list of Threatened Species, Checklist of CITES Species, Floraofnepal.org

4.3 Socio-economic and Cultural Environment

4.3.1 Demographic Features

Altogether 14,897 HHs lie in subproject palika (Sunapati RM, Khandadevi RM and Doramba Sailung RM) in which total population is 68,854. The female population is higher compared to male population in subproject area. The population based on 2011 census in the Rural Municipalities are shown in Table 4-10.

Table 4-10: Population Served by Lubughat - Galpa - Doramba Road

| S.N. | Municipality | Households | Male | Female | Total | Male Ratio | Female Ratio |
|------|-----------------|---------------|---------------|---------------|---------------|------------|--------------|
| 1 | Khandadevi | 5854 | 12,798 | 15,190 | 27,988 | 45.73 | 54.27 |
| 2 | Sunapati | 4373 | 8944 | 10561 | 19505 | 45.85 | 54.15 |
| 3 | Doramba Sailung | 4670 | 9706 | 11655 | 21361 | 45.44 | 54.56 |
| | Total | 14,897 | 31,448 | 37,406 | 68,854 | | |

Source: CBS, Census 2011

4.3.2 Ethnicity and Caste

The subproject site has diversity in ethnic composition. The subproject palika is dominated by Tamang (29.84%) followed by Newar (19.23%), Chhetree (17.86%) and Magar (14.21%). The details of ethnic composition are presented in Table 4-11.

Table 4-11: Ethnic Composition

| S.N. | Ethnic Group | Population | | | | |
|------|------------------|---------------|-------------|--------------------|-------|-------|
| | | Khandadevi RM | Sunapati RM | Doramba Sailung RM | Total | % |
| 1 | Tamang | 6711 | 5784 | 5983 | 18478 | 29.84 |
| 2 | Newar | 5835 | 3130 | 2945 | 11910 | 19.23 |
| 3 | Chhetree | 6717 | 3199 | 1145 | 11061 | 17.86 |
| 4 | Magar | 1856 | 1326 | 5619 | 8801 | 14.21 |
| 5 | Brahman - Hill | 573 | 269 | 1522 | 2364 | 3.82 |
| 6 | Kami | 752 | 412 | 912 | 2076 | 3.35 |
| 7 | Thami | 217 | 0 | 1784 | 2001 | 3.23 |
| 8 | Majhi | 1623 | 100 | 0 | 1723 | 2.78 |
| 9 | Damai/Dholi | 682 | 291 | 282 | 1255 | 2.03 |
| 10 | Sarki | 300 | 120 | 542 | 962 | 1.55 |
| 11 | Pahari | 59 | 0 | 333 | 392 | 0.63 |
| 12 | Others | 123 | 48 | 109 | 280 | 0.45 |
| 13 | Sherpa | 0 | 0 | 150 | 150 | 0.24 |
| 14 | Sanyasi/Dashnami | 136 | 0 | 0 | 136 | 0.22 |
| 15 | Gharti/Bhujel | 77 | 43 | 0 | 120 | 0.19 |
| 16 | Dalit Others | 0 | 64 | 0 | 64 | 0.1 |
| 17 | Badi | 22 | 0 | 35 | 57 | 0.09 |
| 18 | Sunuwar | 40 | 0 | 0 | 40 | 0.06 |
| 19 | Dhobi | 38 | 0 | 0 | 38 | 0.06 |
| 20 | Hyalmo | 0 | 17 | 0 | 17 | 0.03 |

| S.N. | Ethnic Group | Population | | | | |
|------|--------------|---------------|-------------|--------------------|-------|-----|
| | | Khandadevi RM | Sunapati RM | Doramba Sailung RM | Total | % |
| | Total | 25761 | 14803 | 21361 | 61925 | 100 |

Source: CBS, Census 2011

4.3.3 Education and Literacy

The overall literacy rate of the population covered by the Khandadevi Rural Municipality is 65.72%. Among the literate population, about 50.09% have primary education, 11.22% have secondary education, 4.18% have higher secondary education, 0.82 % are graduates and 0.24% are post graduates.

Similarly, the overall literacy rate of the population covered by the Doramba Sailung Rural Municipality is 58.20%. Among the literate population, about 49.59% have primary education, 11.50% have secondary education, 3.62% have higher secondary education, 0.59% are graduates and 0.19% are post graduates.

Further, the overall literacy rate of the population covered by the Sunapati Rural Municipality is 62.21%. Among the literate population, about 46.95% have primary education, 10.03% have secondary education, 4.10% have higher secondary education, 0.96% are graduates and 0.39% are post graduates.

The details of education are presented in Table 4-12.

Table 4-12: Education

| S.N. | Education Level | Male | % | Female | % | Total | % |
|---|------------------------------|--------|-------|--------|-------|--------|-------|
| Khandadevi Rural Municipality | | | | | | | |
| A | Literacy | | | | | | |
| 1 | Illiterate | 2,725 | 23.11 | 6,151 | 43.5 | 8,876 | 34.23 |
| 2 | Literate | 9,063 | 76.85 | 7,979 | 56.43 | 17,042 | 65.72 |
| 3 | Not Stated | 5 | 0.04 | 10 | 0.07 | 15 | 0.06 |
| | Total | 11,793 | 100 | 14,140 | 100 | 25,933 | 100 |
| B | Education level | | | | | | |
| 1 | Beginner | 147 | 1.82 | 141 | 2.02 | 288 | 1.91 |
| 2 | Primary (1-5) | 4,074 | 50.33 | 3,485 | 49.81 | 7,559 | 50.09 |
| 3 | Lower secondary (6 -8) | 1,827 | 22.57 | 1,645 | 23.51 | 3,472 | 23.01 |
| 4 | Secondary (9 -10) | 886 | 10.95 | 808 | 11.55 | 1,694 | 11.22 |
| 5 | S.L.C. & equiv. | 725 | 8.96 | 555 | 7.93 | 1,280 | 8.48 |
| 6 | Intermediate & Equivalent | 306 | 3.78 | 325 | 4.64 | 631 | 4.18 |
| 7 | Graduate & Equivalent | 93 | 1.15 | 30 | 0.43 | 123 | 0.82 |
| 8 | Post Graduate equiv. & Above | 31 | 0.38 | 5 | 0.07 | 36 | 0.24 |
| 9 | Others | 6 | 0.07 | 3 | 0.04 | 9 | 0.06 |
| | Total | 8,095 | 100 | 6,997 | 100 | 15,092 | 100 |
| Doramba Sailung Rural Municipality | | | | | | | |
| S.N. | Education Level | Male | % | Female | % | Total | % |
| A | Literacy | | | | | | |
| 1 | Illiterate | 2,739 | 30.94 | 5,482 | 50.56 | 8,221 | 41.74 |
| 2 | Literate | 6,112 | 69.04 | 5,351 | 49.35 | 11,463 | 58.2 |
| 3 | Not Stated | 2 | 0.02 | 9 | 0.08 | 11 | 0.06 |

| S.N. | Education Level | Male | % | Female | % | Total | % |
|------------------------------------|------------------------------|-------|-------|--------|-------|--------|-------|
| | Total | 8,853 | 100 | 10,842 | 100 | 19,695 | 100 |
| B | Education level | | | | | | |
| 1 | Beginner | 157 | 2.89 | 119 | 2.49 | 276 | 2.7 |
| 2 | Primary (1-5) | 2,775 | 51.01 | 2,290 | 47.97 | 5,065 | 49.59 |
| 3 | Lower secondary (6 -8) | 1,298 | 23.86 | 1,277 | 26.75 | 2,575 | 25.21 |
| 4 | Secondary (9 -10) | 587 | 10.79 | 588 | 12.32 | 1,175 | 11.5 |
| 5 | S.L.C. & equiv. | 367 | 6.75 | 301 | 6.3 | 668 | 6.54 |
| 6 | Intermediate & Equivalent | 185 | 3.4 | 185 | 3.88 | 370 | 3.62 |
| 7 | Graduate & Equivalent | 50 | 0.92 | 10 | 0.21 | 60 | 0.59 |
| 8 | Post Graduate equiv. & Above | 19 | 0.35 | - | 0 | 19 | 0.19 |
| 9 | Others | 2 | 0.04 | 4 | 0.08 | 6 | 0.06 |
| | Total | 5,440 | 100 | 4,774 | 100 | 10,214 | 100 |
| Tinpatan Rural Municipality | | | | | | | |
| S.N. | Education Level | Male | % | Female | % | Total | % |
| A | Literacy | | | | | | |
| 1 | Illiterate | 1682 | 26.74 | 3,532 | 46.92 | 5,214 | 37.73 |
| 2 | Literate | 4,605 | 73.2 | 3,992 | 53.03 | 8,597 | 62.21 |
| 3 | Not Stated | 4 | 0.06 | 4 | 0.05 | 8 | 0.06 |
| | Total | 6,291 | 100 | 7,528 | 99.95 | 13,819 | 100 |
| B | Education level | | | | | | |
| 1 | Beginner | 154 | 3.46 | 126 | 3.32 | 280 | 3.6 |
| 2 | Primary (1-5) | 2,010 | 45.11 | 1646 | 46.31 | 3,656 | 46.95 |
| 3 | Lower secondary (6 -8) | 947 | 21.25 | 878 | 24.70 | 1,825 | 23.44 |
| 4 | Secondary (9 -10) | 408 | 9.64 | 373 | 10.49 | 781 | 10.03 |
| 5 | S.L.C. & equiv. | 486 | 11.48 | 328 | 9.23 | 814 | 10.45 |
| 6 | Intermediate & Equivalent | 150 | 3.54 | 169 | 4.75 | 319 | 4.1 |
| 7 | Graduate & Equivalent | 53 | 1.25 | 22 | 0.62 | 75 | 0.96 |
| 8 | Post Graduate equiv. & Above | 22 | 0.52 | 8 | 0.23 | 30 | 0.39 |
| 9 | Others | 3 | 0.07 | 4 | 0.11 | 7 | 0.09 |
| | Total | 4,233 | 96.32 | 3,554 | 99.77 | 7,787 | 100 |

Source: CBS, Census 2011

4.3.4 Language

The dominant language spoken in the subproject palikas is Nepali with 52.82% followed by Tamang which is spoken by 28.14%. Other languages are Newar (9.68%), Thami (3.10%), Magar (2.80%) and other languages (3.29%).

4.3.5 Occupation

Based on District profile of Ramechhap district, 91.8% of the population are involved in agriculture. Similarly, 2% of the population are involved in educational field and 1.67% are involved in small scale business, workshop, etc.

4.3.6 Religious and Cultural Sites

Dashain and Tihar are the major festival in the subproject area. Since, majority of the

population belongs to Tamang community, Sonam Lhosar is another major festival celebrated along the proposed alignment.

4.3.7 Health

In the subproject palikas (Sunapati RM, Khandadevi RM and Doramba Sailung RM), There are 19 Health Post and 9 community health unit. (Source: DOHM- 2074-75)

4.3.8 Water Supply

A major source of drinking water was found to be from piped water supplied through community made water tanks (74.41%) followed by uncovered well/kuwa (7.12%). The details of sources of drinking water are presented in Table 4-13.

Table 4-13: Sources of Drinking Water

| S.N | Source of Water | Khandadevi RM | | Sunapati RM | | Doramba Sailung RM | |
|-----|---------------------|---------------|----------------|--------------|----------------|--------------------|----------------|
| | | HH | % | HH | % | HH | % |
| 1 | Tap/piped water | 3,612 | 61.70% | 3,549 | 78.97% | 4,014 | 85.95% |
| 2 | Uncovered well/kuwa | 476 | 8.13% | 248 | 5.52% | 345 | 7.39% |
| 3 | Tube well/handpump | 440 | 7.52% | 4 | 0.09% | 5 | 0.11% |
| 4 | Spout water | 692 | 11.82% | 455 | 10.12% | 187 | 4.00% |
| 5 | Covered well/kuwa | 241 | 4.12% | 69 | 1.54% | 34 | 0.73% |
| 6 | River /stream | 332 | 5.67% | 141 | 3.14% | 30 | 0.64% |
| 7 | Others | 5 | 0.09% | 2 | 0.04% | 2 | 0.04% |
| 8 | Not Stated | 56 | 0.96% | 26 | 0.58% | 53 | 1.13% |
| | Total | 5,854 | 100.00% | 4,494 | 100.00% | 4,670 | 100.00% |

Source: CBS, Census 2011

4.3.9 Sanitation Facility

Access to toilet is considered as an indicator of sanitation. In the subproject area, 49.99% of population are without toilet, about 32.31% have flush toilets and 16.81% have basic toilet facilities. The details of toilet types along with the household number are presented in Table 4-14.

Table 4-14: Toilet Types

| S.N. | Toilet Type | Khandadevi RM | | Sunapati RM | | Doramba Sailung RM | | Total | |
|------|-----------------|---------------|-----------------|--------------|----------------|--------------------|----------------|---------------|---------------|
| | | HH | % | HH | % | HH | % | HH | % |
| 1 | No Toilet | 2,699 | 46.11% | 1,576 | 47.51% | 2,644 | 79.71% | 6,919 | 49.99 |
| 2 | Flush Toilet | 2,034 | 34.75% | 1,281 | 38.62% | 1,157 | 34.88% | 4,472 | 32.31 |
| 3 | Ordinary Toilet | 1,064 | 18.18% | 445 | 13.42% | 817 | 24.63% | 2,326 | 16.81 |
| | Not Stated | 57 | 0.97% | 15 | 0.45% | 52 | 1.57% | 124 | 0.90 |
| | Total | 5,854 | 100.00 % | 3,317 | 100.00% | 4,670 | 140.79% | 13,841 | 100.00 |

Source: CBS, Census 2011

4.3.10 Socio-economic Profile of Surveyed Households in DIZ

Community Participation Plan (CPP) team carried out the socio- economic survey of the affected households whose land or properties lies within the formation width of the road alignment. The total number of affected land plots by the subproject is 750. Out of which, plots verified as private land is 509 plots (holding – 361 HHs) and plots unverified is 241 plots. The land to be acquired from verified plots and unverified plots are 7.93 ha and 4.63 ha respectively. Based on the land loss percentage in respective land plots majority 430 land plots will lose less than 10%, 221 land plots will lose between 10% – 20% and 99 land plots loose above 20%. The field survey did not identify severely affected HHs due to acquisition of land as they hold more than one land parcel. The number of affected private structure by the subproject is 25 (residential houses – 25 nos. and sheds/huts – 5 nos.). In addition to the private properties, a temple is also affected by the subproject. The CPP team carried out the rapid census survey (199HHs) from the affected households during the transect walk survey. Population of the surveyed household is 819 (male – 426, female – 393), average family size is 4.12. Caste and ethnicity of affected households revealed; brahmin/ Chettri is 31HHs, indigenous household is 157HHs, vulnerable households are 11 HHs (dalit). Number of women headed HHs among affected household is 25 HHs. (Source: CPP, 2022)

Household survey in the Project Area was conducted for the inventory of socio-economic and cultural data. From the drone imagery, 1804 houses were observed along the road alignment (125 m on either side from centre of the road) and around 10% of 1804 were taken as sample houses (i.e., 179 houses) for social survey. From the household survey it revealed that 179 houses belong to 179 HHs. From the household survey along the proposed alignment, total populations of the household are 926. Most of the population belong to Tamang (50.84%), while significant portion are Chhetri (24.02%) and few are Magar (8.38%), Dalit (8.94%) and Newar (7.26%).

Different socio-economic aspect of the household surveyed are illustrated in Table 4-15 to Table 4-22:

Table 4-15: Religion followed by Surveyed HH

| S.N. | Religion | HH | Percentage |
|------|--------------|------------|---------------|
| 1 | Buddhism | 86 | 48.04 |
| 2 | Hinduism | 92 | 51.40 |
| 3 | Christianity | 1 | 0.56 |
| | Total | 179 | 100.00 |

Source: Household Survey 2022

Table 4-16: Language spoken by Surveyed HH

| S.N. | Language | HH | Percentage |
|------|--------------|------------|---------------|
| 1 | Nepali | 83 | 46.37 |
| 2 | Tamang | 89 | 49.72 |
| 3 | Magar | 1 | 0.56 |
| 4 | Newari | 4 | 2.23 |
| 5 | Tibetan | 1 | 0.56 |
| 6 | Maithali | 1 | 0.56 |
| | Total | 179 | 100.00 |

Source: Household Survey, 2022

Table 4-17: Literacy status of Surveyed HH

| S.N. | Education Level | Total | Percentage |
|------|---------------------|------------|---------------|
| 1 | Illiterate | 211 | 24.06 |
| 2 | Literate Only | 100 | 11.40 |
| 3 | Primary Education | 129 | 14.71 |
| 4 | Middle Education | 83 | 9.46 |
| 5 | Secondary Education | 292 | 33.30 |
| 6 | Graduate and more | 62 | 7.07 |
| | Total | 877 | 100.00 |

Source: Household Survey, 2022

Table 4-18: Toilet Facility of Surveyed HH

| S.N. | Toilet Type | HH | Percentage |
|------|------------------|------------|---------------|
| 1 | No Toilet | 0 | 0.00 |
| 2 | Temporary Toilet | 17 | 9.50 |
| 3 | Permanent Toilet | 162 | 90.50 |
| | Total | 179 | 100.00 |

Source: Household Survey 2022

Table 4-19: Occupation of Surveyed HH

| S.N. | Occupation | Total | Percentage |
|------|--------------------|------------|---------------|
| 1 | Agriculture | 182 | 23.64 |
| 2 | Housewife | 151 | 19.61 |
| 3 | Labour | 25 | 3.25 |
| 4 | Student | 124 | 16.10 |
| 5 | Foreign Employment | 24 | 3.12 |
| 6 | Business | 78 | 10.13 |
| 7 | Teacher | 15 | 1.95 |
| 8 | Driver | 22 | 2.86 |
| 9 | Government Job | 10 | 1.30 |
| 10 | Private Job | 107 | 13.90 |
| 11 | Unemployed | 32 | 4.16 |
| | Total | 770 | 100.00 |

Source: Household Survey 2022

Table 4-20: Food Sufficiency of Surveyed HH

| S.N. | Description | HH | Percentage |
|------|--------------------|------------|---------------|
| 1 | No Production | 16 | 8.94 |
| 2 | Less than 3 Months | 24 | 13.41 |
| 3 | 3-6 Months | 84 | 46.93 |
| 4 | 6-9 Months | 23 | 12.85 |
| 5 | 9-12 Months | 30 | 16.76 |
| 6 | Surplus | 2 | 1.12 |
| | Total | 179 | 100.00 |

Source: Household Survey 2022

Table 4-21: Drinking Water Source of Surveyed HH

| S.N. | Description | HH | Percentage |
|------|---------------|------------|---------------|
| 1 | Personal Tap | 39 | 21.79 |
| 2 | Community Tap | 135 | 75.42 |
| 3 | Well | 3 | 1.68 |
| 4 | Kuwa | 1 | 0.56 |
| 5 | Tube well | 1 | 0.56 |
| | Total | 179 | 100.00 |

Source: Household Survey 2022

Table 4-22: Average Annual Income and Poverty Status of Surveyed HH

| S.N. | Annual Income | HH | Percentage |
|------|-------------------|------------|---------------|
| 1 | Less than 100,000 | 0 | 0.00 |
| 2 | 100,000 – 200,000 | 23 | 12.85 |
| 3 | 200,000 – 300,000 | 27 | 15.08 |
| 4 | 300,000 – 400,000 | 32 | 17.88 |
| 5 | 400,000 – 500,000 | 20 | 11.17 |
| 6 | More than 500,000 | 77 | 43.02 |
| | Total | 179 | 100.00 |

Source: Household Survey 2022

Ministry of Federal Affairs and General Administration
Rural Connectivity Department
Project Unit
Lubughat-Galpa-Doramba Road
Ramechhap District



Ministry of Federal Affairs and General Administration
Government of Nepal
Singha Durbar, Kathmandu

5 REVIEW OF RELEVANT ACTS, POLICIES, RULES, REGULATIONS AND GUIDELINES

Government of Nepal has adopted various acts, regulations and guidelines to ensure the integration of development and conservation of the environment. The IEE was guided by the requirements and provisions of the following acts, rules and guidelines as applicable.

5.1 Constitution

5.1.1 Constitution of Nepal

Article 30 Right to Clean Environment; of the Constitution of Nepal proclaims that; (1) Every citizen shall have the right to live in a clean and healthy environment (2) The victim shall have the right to obtain compensation, in accordance with the law, for any injury caused from environmental pollution or degradation. (3) This Article shall not be deemed to prevent the making of necessary legal provisions for a proper balance between the environment and development, in the development works of the nation.

Article 34 Right to labour; of the Constitution of Nepal proclaims that (1) Every labourer shall have the right to practice appropriate labour. (2) Every labourer shall have the right to appropriate remuneration, facilities and contributory social security and (3) Every labourer shall have the right to form and join trade unions and to engage in collective bargaining, in accordance with the law.

Article 35 Right relating to health; of the Constitution of Nepal proclaims that (1) Every citizen shall have the right to free basic health services from the State, and no one shall be deprived of emergency health services. (2) Every person shall have the right to get information about his or her medical treatment. (3) Every citizen shall have equal access to health services. (4) Every citizen shall have the right of access to clean drinking water and sanitation.

Article 51 Policy of the state; clause (2) (f) mentioned that the state is to develop balanced, environment friendly, quality and sustainable physical infrastructures, while according priority to the regions lagging behind from a development perspective, and clause (3) mentions that state is to enhance local public participation in the process of development works. Article 51 (g) explains about applying appropriate minimization or mitigation measures for negative impact on nature, environment or biodiversity.

5.2 Plans and Policies

5.2.1 National Environmental Policy 2076 BS (2019 AD)

National Environment Policy 2076 BS (2019 AD) has been enforced to unify and integrate environmental concern on all development policies. The policy aims to maintain balance between environment and development and minimize negative effect on nature, environment and natural ecosystem.

5.2.2 National Climate Change Policy 2076 BS (2019 AD)

The policy aims at contributing to economic prosperity of the country. It incorporates development according to the climate change policy, development of flexibility in environmental system, adopt economic policies to reduce carbon emission and promote



green economics, implement national and international funds, make communication service effective and change climate change to relevant policy and strategy. It provides guideline to adopt environment friendly technology and minimize negative effects on the environment.

5.2.3 National Forest Policy 2075 BS (2017 AD)

The policy concentrates on long-term, participatory and responsible forest management, development of green enterprise and protection of bio-diversity and environmental services. The policy aims to manage forest resource sustainably, increase productivity of forest area/sector and increase overall production from forest. Similarly, to conserve biodiversity, conservation of sources, and equal sharing and distribution of environmental services gained from conservation; to encourage private sector for the development and conservation of forest sector; to reduce and mitigate the adverse impacts of climate related hazards and enhance climate change adaptation measures and resilience in Nepal.

5.2.4 Policy Document, Environmental Assessment in the Road Sector of Nepal (2000 AD)

The purpose of the policy document is to ensure that development improves the way of life for the people affected, without damaging the natural surroundings. Sometimes a degree of damage is inevitable. In such case, an environmental assessment should find ways of reducing or compensating for the damage. The policy document suggested five types of environmental assessment activities viz. Screening, Initial Environmental Examination, Scoping, Environmental Impact Assessment and Monitoring.

5.2.5 Land Acquisition, Resettlement, and Rehabilitation Policy for Infrastructure Development Project 2071 BS (2015 AD)

Land Acquisition, Resettlement and Rehabilitation for Infrastructure Development Project, 2014 has been formulated with the objective of providing services like compensation, resettlement and rehabilitation to the affected people depending on the nature of effects, so as to help them keep their social and economic situations before the project or help them reach the higher socio-economic ladder. The Policy also aims to adopt a uniform approach in carrying out these measures and reducing adverse risks of project implementation thus ensuring smooth operation of project. This Policy shall provide a guideline in implementing the project and establishing coordination among various ministries on land acquisition issues.

The policy has the following major guiding principles:

Section 8(8.2.6d) states that Compensation of physical infrastructure shall be provided in replacement cost. The valuation of such infrastructure and determination of compensation money shall be done on the basis of the approved standards of the concerned government authority

Section 8(8.2.8c) states that Basic infrastructures such as pathway, sanitation, electricity, drinking water, school, dumping site, drinking water, electricity, schools, hospitals, temples, community hall, crematorium sites etc shall be set up in the resettlement areas

Section 8(8.2.8g) states that Special program shall be implemented while resettling the affected individuals and families so as to ensure that their resettlement does not adversely affect the lives of the locals of the resettlement area. The locals shall be consulted while doing so. Provision shall also be made so as to allow the locals to use physical

infrastructures such as drinking water, electricity; pathway, community building etc set up in the resettlement sites. Local NGOs, community organizations and social mobilizers shall be mobilized while executing resettlement programs

Section 11 Government and public land not be used: Normally, no company shall be entitled to use the government and public land without taking permission from the Government of Nepal. However, if using government and public land becomes unavoidable during the course of project implementation (such as for resettlement and rehabilitation purpose, infrastructure development purpose etc), permission of Government of Nepal shall have to be taken through Ministry of Land Reform and Land Management

Section 9(9.1.1) state that land may be acquired through Voluntary donation: In case of the projects that can advantage the affected individuals and families, if the development project has been executed upon the demands of the locals, individual and families of the community. The following condition should be met while acquiring

- o If the area of the land to be donated is less than 10% of the productive land that the affected individuals and families have been owning and using;
- o If the affected families and individuals do not fall under the deprived and marginalized farmers category;
- o If the donating family is well- informed about its right to decline or accept the proposal of land donation;
- o If the donating party has not taken this decision under pressure but has accepted to donate it voluntarily and through the written agreement made in the presence of third party;
- o If an understanding has been reached with the affected family during the period of pre- feasibility study and feasibility study, and if the basic procedures such as land measurement and kittakat and ownership transfer have been completed during the period of detailed engineering design; and
- o the disputed land will not be acquired even if it is voluntarily donated.

The overview of the policy is to provide favourable environment to implement development projects and help in overall upliftment of people and the country. It proposes to provide proper compensation, proper resettlement plan and resettlement assistance to affected people and help in their social and economic status when land needs to be acquired for development and/or public beneficiary projects. It also proposes to avoid resettlement as far and practicable and only work for minimizing the negative effects if such avoidance is not attainable.

5.2.6 National Transport Policy 2058 BS (2002 AD)

The principal objective of the National Transport Policy is to develop a reliable, cost effective, safe facility oriented and sustainable transport system that promotes and sustains the economic, social, cultural and tourism development of the Kingdom of Nepal as a whole. For the attainment of these objectives the following strategies will be followed:

- The government shall clearly indicate the limit and scope of the work to be done from the central level and take responsibility of transport structure to be constructed from the central level;

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- Making the decentralized governance system more strengthened and by maximum utilizing the source and means of local level, the development and promotion of transport system shall be done from the local level itself; and
- Maximum private Sector involvement will be encouraged in the expansion and preservation of the transport system.

The policy focuses on the development of transport infrastructure in the local level to carry out in accordance with the short term, medium term and long-term planning and high priority in completing the construction of roads connecting all District Headquarters of the Country to the main road network

5.2.7 Land Use Policy 2075 BS (2017 AD)

The policy has provided preference in conservation of agricultural land to ensure food security. It undertakes that the risk of natural disaster during physical infrastructure development needs to be accounted for.

5.2.8 Safeguard Policy Statement of ADB 2009 AD

Safeguard policies are generally understood to be operational. It seeks to avoid, minimize, or mitigate adverse environmental and social impacts, including protecting the rights of those likely to be affected or marginalized by the development processes.

The Safeguard Policy Statement (SPS)-2009 provides an overarching statement on ADB's commitment to environmental and social sustainability that sets out three policy objectives:

- To avoid adverse impacts of projects on the environment and affected people, where possible;
- To minimize, mitigate, and/or compensate for adverse project impacts on the environment and affected people when avoidance is not possible; and
- To help borrowers/clients to strengthen their safeguard systems and develop the capacity to manage environmental and social risks.

5.2.9 Fifteenth Plan (2076/77 – 2080/81 B.S.)

National Planning Commission, Nepal Government has prepared the plan from 2076/77 through 2080/81. It emphasizes on sustainable natural resources and increase investment on important roads and bridges.

5.2.10 Nepal Environmental Policy and Action Plan 1993

Nepal Environmental Policy and Action Plan were endorsed to further institutionalize environmental protection in the development processes. NEPAP recognizes that a growing number of people are exposed to pollution from industrial enterprises. NEPAP identifies the following factors as contributing to this process;

- Industrial plant inappropriately cited close to population centres
- insufficient emphasis on fuel efficiency;
- Little, if any pollution abatement equipment used for reducing emission; and
- A total lack of industry pollution standards;

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Hence, the NEPAP emphasized the need for mitigating adverse environmental impacts to address urban and industrial development, air and water pollution and infrastructures development.

5.2.11 Nepal Road Safety Action Plan (2013 to 2020)

The action plan has primary vision of safe road infrastructures and services backed with effective post-crash response and conducive environment resulting in little or no casualties from the Road Traffic Accidents (RTAs). Its mission is:

- To mitigate the loss of life, properties and economic loss from RTAs.
- To complement the broader mission of the National Strategy on the Prevention and Control of Violence, Injuries and Disabilities.
- To meet the targets of the UN Decade of Action.
- To provide a common framework for stakeholder agencies to implement the various interventions required to mitigate RTAs outcomes.

5.3 Acts

5.3.1 Environment Protection Act 2076 BS (2019 AD)

Nepal has enacted a comprehensive and umbrella type environmental protection act 2019 replacing the Environmental protection Act 1997. This act is the principal regulatory frameworks to make the development programs and projects environment-friendly, which are now enforced through appropriate regulatory measures. The law contains several provisions to internalize environmental assessment system and to maintain a clean and healthy environment by minimizing the adverse impacts on human beings and other life forms and physical objects. The act highlights that any development project, before its implementation has to pass through environmental assessment, which will be either short environmental assessment, IEE or EIA depending upon the location, type and size of the projects. As our project falls on schedule 2 of the EPA 2019, it requires only IEE study.

Section 3 (1) of the Act requires the proponent to conduct an IEE and EIA in relation to the prescribed proposals. Section 3(2) of the Act prohibits implementation of development proposals without prior approval of the concerned agencies or MOFAGA as specified by the Act.

5.3.2 Local Government Operation Act 2074 BS (2017 AD)

The Act, 2074 (2017) provides more autonomy to District Coordination Committees, Municipalities and Rural Municipalities. The Act provides the functions, rights and duties of the Ward Committee. Act requires the ward to help for protection of environment through plantation over the bare land, cliff and mountains. It has mentioned the functions, rights, and duties of RMs, Municipalities and DCC. The RMs are required to protect the environment, nature and natural resources. The act empowers RMs/MC/DCC to levy taxes on utilization of natural resources. Apparently, natural resources include mineral resources and thus, RMs have an absolute authority over the natural resources. Thus, this act empowers the local bodies for the conservation of soil, forest, and other natural resources, and implements environmental conservation activities.

5.3.3 Forest Act, 2076 BS (2019 AD)

Clause 42 of the Act empowers government for providing the forest area for infrastructure establishment following the different conditions; Clause 42 (1) government can provide the parts of the forest areas to implement national priority project, or national pride project or the project decided by the government for immediate implementation. This Section has also provisioned for compensation of the forest area: 42 (1) the project should regenerate at least same area to be handed over to forest, 42(5) if the project failed to get proper land for the compensatory plantation purpose it can provide equivalent amount of money for the forest development. 42 (6,7) projects can provide the amount for compensatory plantation and caring till 5 years to Forest Development Treasury.

5.3.4 Land Acquisition Act 2034 BS (1977 AD)

Land Acquisition Act 2034 (1977) is the main legislation to guide the involuntary acquisition of land in the country. Government can acquire land at any place in any quantity by giving the compensation pursuant to the Act for the land required for any public purpose. Section 33 of the Act describe land acquired by the Government of Nepal if not required of that purpose, the Government may use such land for public purpose. Section 34 of the Act describe land found unnecessary for the purpose for which it has been acquired shall be returned to the expropriated landowner.

5.3.5 Public Road Act 2031 BS (1974 AD) (with amendments)

The Public Road Act is the governing legislation for construction and operation of roads in Nepal. The Act prohibits the construction of permanent structures (buildings) in a defined distance from the rural road, i.e., the road agency has the authority over everything within the right of way. The act makes provision for cases where road projects temporarily require land and/or other properties during construction, rehabilitation and maintenance. A Compensation Fixation Committee CFC determines compensation in case of loss of assets, business or production. Provisions are also detailed for compensation for the extraction of construction materials. Article 19 of the Act mandates requirement of permission from the Department of Roads to carry out activities within the limits of the road boundaries. As per Article 29, local governmental offices have to give notice to the DoR prior to the start of activities in the limits of the public roads. The Act empowers DoR to acquire any land on a temporary basis (for storage facilities, construction camps, etc.) during road construction and upgrading. The temporary acquisition of land containing any buildings (e.g., houses, sheds, temples and schools) is avoided wherever possible. The Act also empowers DoR to "lift earth, stone or sand from any adjoining land" during construction and upgrading works.

The Act does not provide for leasing of land. However, DoR is required to pay compensation for any damages caused to buildings, crops and trees, where the farming activity of the landowner is interrupted, and where the landowner has to incur expenses to restore the land after its return. Compensation is determined between DoR and the titleholder, or through mediation, involving officials from the relevant VDC and District.

The GoN may prohibit, through notification in the Nepal Rajapatra (Government Gazette), the construction of any permanent structure (other than walls) within 6 m of the road formation edge.



5.3.6 Soil and Watershed Conservation Act 2039 BS (1982 AD)

The mismanagement of watersheds leads to the degradation of valuable land by flooding, water-logging, and accelerated silt in storage reservoirs. In order to properly manage the watersheds of Nepal, the Soil and Watershed Conservation Act (SWCA) was enacted in 1982.

Section 3 empowers Government of Nepal can declare any area of Nepal as a conserved watershed area, specifying the borders thereof. Section 4 provides that a watershed conservation officer has the authority to implement the following works in protected watershed areas:

Construct and maintain dams, embankment, terrace improvements, diversion channels and retaining walls, protect vegetation in landslide-prone areas and undertake afforestation programs, and regulate agricultural practices pertinent to soil and watershed conservation.

Section 13 empowers The Watershed Conservation Officer may prohibit the commission of any acts that may cause soil-erosion or soil cutting in a land where any of the acts has been done under Section 4 and in vicinity of such land.

5.3.7 Solid Waste Management Act 2068 BS (2011 AD)

It is expedient to make the management of the solid waste in a systematic and effective way by reducing at its source, re-use, processing or discharge and for maintaining a clean and healthy environment through the reduction of adverse effects that may be caused to the public health and environment by amending and consolidating the law relating to the management of solid waste like most essential services laws.

5.3.8 Water Resource Act, 2049 B.S. (1992 AD)

The objectives of the Water Resources Act, 1992 is to make legal arrangements for determining beneficial uses of water resources, preventing environmental and other hazardous effects thereof and also keeping water resources free from pollution. The Act strives to minimize environmental damage to water bodies, especially lakes and rivers through environmental impact assessment studies.

Under Section 19, it is clearly mentioned that No one shall pollute water resource by way of using or putting any litter, industrial wastes, poison, chemical or toxicant to the effect that the pollution tolerance limit of the water resource as prescribed pursuant to Sub-section (1) is exceeded.

5.3.9 Labour Act 2074 BS (2017 AD)

Labor Act, 2017 and Labor Rules, 2018 deals deal with labor of various sector. Clause 28 under Section 7 Provisions Relating to Working Hours, the Act defines working time as eight hours a day and forty eight hours in a week. A half an hour break should be given as snack and tea break before continuous work of maximum five hours. Under Section 12 Provisions Relating to Occupational Safety and Health Clause 68 to 83 gives details for occupational health and safety requirement to be maintained for labors. According to clause 74, employer should constitute a Safety and Health Committee where 20 or more employees are engaged. Clause 69 Duties of employers towards the workers in respect of Occupational Safety and Health shall be Ensure safe environment by making appropriate safety and

health provisions at the workplace. Clause 78. Special provisions relating to Occupational Safety and Health includes the safety and health standard of the enterprises engaged in the activities relating to the following matters shall be as prescribed:

- Provisions relating to protection of eyes;
- Provisions relating to protection from chemical substances;
- Provisions relating to operation of pressure plant;
- Provisions relating to safeguard of machines;
- Provisions relating to lifting of load; and
- Any other provision.

5.3.10 Child Right Act 2075 BS (2018 AD)

The act relating to children was enacted by Federal parliament in order to maintain the best interests of the children by respecting, protecting, promoting and fulfilling the rights of the child.

5.3.11 Child Labour (Prohibition and Regulation) Act 2056 BS (2000 AD)

The Child Labour (Prohibition and Regulation) Act 2000 is the main legal expedient to prohibit engaging children in factories, mines or similar risky activities and to make necessary provisions with regard to their health, security, services and facilities while engaging them in other activities.

Under the Section 3 of the Act, child having not attained the age of 14 years is strictly prohibited to be engaged in works as a labourer. Similarly, under Section 4, engagement of child in works as a labourer against his/her will by way of persuasion, misrepresentation or by subjecting him/her to any influence or fear or threat or coercion or by any other means is prohibited. Under Section 6, in case any Enterprise has to engage a child in works, an approval has to be obtained from the concerned labour office or any authority or official prescribed by that office and from the father, mother or guardian of the child.

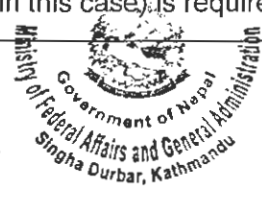
5.3.12 सङ्कटापन्न वन्यजन्तु तथा वनस्पति अन्तराष्ट्रिय व्यापार नियन्त्रण ऐन 2073 B.S (2017 A.D)

This Act was formulated to conserve and regulate and monitor the international trade of threatened fauna and flora in order to implement the CITES, 1973. This Act has banned trade and sample collection of rare and endangered species of flora fauna. This act has also banned for holding, keeping in possession, use, rearing, and control of such species. The main aim of this act is implementation of the objective set forward by the CITES, 1973.

5.4 Rules and Regulations

5.4.1 Environment Protection Regulation 2077 BS (2020 AD)

As per Rule 3, for the proposal under schedule 1 of EPR 2020, a short environmental assessment is required, similarly, for the proposal under schedule 2 IEE is required and proposal under schedule 3 EIA is required. As our proposal falls under schedule 2 requires only IEE study. For our road project as per EPR 2077(Amendment 2078), schedule 2 (Nga) Road Sector (8) pertaining to rule 3, IEE is required for upgrading roads of length greater than 10 km and up to 50 km. As the proposed road is 19.82 km long, preparation of IEE report and approval from the concerned ministry (MoFAGA in this case) is required.



IEE study report was prepared as per approved ToR, rule 5 and comments and suggestions received from public hearings as per rule 6.

5.4.2 Forest Rules, 2051 BS (1995 AD)

Rule 65 of the regulation obliges the proponent to bear the amount of compensation to be paid for any loss or harm to any local individuals or communities. Similarly, the entire expenses for the cutting and transporting of forest products for the use of the project should be borne by the proponent. The rules also provide absolute authority to local communities to manage the forests and get all the benefits from the forests.

5.4.3 Solid Waste Management Rule 2070 BS (2013 AD)

The Solid Waste Management Rules, 2070 was formulated as per provision made in Article 50 of Solid Waste Management Act, 2068. The Rules contain 27 sections that provision the methodology, procedures, technology and execution of solid waste management. This regulation has emphasized the segregation of hazardous waste at source and mentioned that the responsibility of proper disposal and management of segregated hazardous waste belongs to the producers themselves.

Section 3 of the Rule describes about the segregation and management of solid waste. It has mentioned that while segregating solid waste in degradable and non-degradable waste at source, it is essential to segregate waste into hazardous and chemical waste. It also states that the local body will be responsible for conducting awareness program regarding source reduction, source separation and adopting suitable technologies.

5.4.4 Labour Rules 2075 BS (2018 AD)

The Labor Rule, 2075 guarantees safe working environment. It also lists detail measures to be followed regarding Occupational Safety and Health. Under rule 17, if the employee is accompanied with a child under age 3, extra half an hour should be provided for breast feeding, Rule 35 provisioned for employer being responsible for safety of employees in the work places. Rule 39 provides detail measures to be follow regarding Occupational Safety and Health.

5.5 Guidelines/ Work Procedure

5.5.1 Work Procedure with Standards for the Use of National Forest Land for National Priority Project, 2076

This procedure is formed using the right given by Forest Act, 2049 BS, Section 72(Ka). The procedure is incorporated to provide agreement to use National Forest land to projects of national preference, Investment Board, National Pride project or electrical transmission line of national preference. The said project can be public, private or public-private partnership project.

Section 8 (1) describes, if any project is using the National Forest Area, then the project needs to provide with the land of equivalent area as replacement to the area of the Forest land. Section 8 (3) describes, in case of National project, the amount of land that need to be replaced needed to be included in the Estimate of the Project.

Section 17 (1) describes, the project receiving permission to use the forest area and removal

of trees, has to handover the cut down trees to the Forest Office and the cost need to be borne by the project itself. Section 17 (3) describes, project has to carry out plantation as compensation for each cut down tree at the rate of 1: 10 in the land determined by the Forest Office. Section 17 (4) describes, Project has to maintain and protect the planted trees for five years and handover to the Forest Office. Section 17 (5) describes, the cost for the plantation including maintenance and protection cost for five years need to be included in the Project Estimate.

5.5.2 Occupational Safety and Health Guidelines, (DoLIDAR 2017 A.D)

This guideline has been prepared with help of ILO and has been promulgated to ensure occupational safety and health with the following vision:

- For safe and healthy environment to work as envisioned by the constitution.
- To increase productivity by establishing safe and healthy work environment
- Minimize physical and human loss.
- Cluster industries, businesses or workplaces according to safety and health requirements and develop required guidelines, data and safety systems for safe working environment.
- Recognize occupational health hazards and list them on national level.

Section 6 of this guideline describes the safety and health responsibilities on site. Section 8 describes the first aid and injuries that the contractors and sub-contractors must ensure that all workers and staffs are linked to medical care centre or health posts, nearest to the site. Section 9 describes all accidents and dangerous occurrences must be recorded regardless of whether or not personnel injuries occur. Section 10 describes that training should be provided to all workers at no cost and should take place during working hours, if possible. Section 12 describes that appropriate PPE shall be provided to all workers at no cost. Section 13 describes hazard identification and control of risks within or outside the workplace. Section 21 describes contractors must ensure that there are illustrated safety signage displayed around the site as deemed necessary. Section 22 describes contractors must ensure that all vehicles used on worksite shall be roadworthy and comply with the local Authorities in charge of the area.

5.5.3 Environmental and Social Management Framework (ESMF), DoR-GESU, GoN (2008 AD)

This Environmental and Social Management Framework report (ESMF) is prepared for the Department of Roads (DoR) to compile in an overview and guidance manner, various safeguard and compliance aspects of environmental and social issues related with the Sector Wide Road Program and the Priority Investment Plan Study for Nepal's Strategic Road Network (SRN) planning for 2007 to 2016.

The ESMF intends to provide technical and managerial inputs and guidance into the design of the strategic roads (both designated for rehabilitation and, to lesser extent, to new construction, through identification of key environmental and social issues related to the foreseen projects (hereunder referred as "SRN subprojects"), mitigate potential impacts and concerns and, devise opportunities to enhance the benefits. The framework integrates in a step-wise approach the most important environmental and social considerations into all stages of project preparation, implementation, monitoring and operation and is applicable to all future subprojects funded under the SRN program.

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5.5.4 Environmental Management Guidelines, GESU-DoR, GoN (1997 AD)

The guideline has been prepared to ensure that environmental considerations are integrated into the project survey and design, tender documents, contract documents, and project supervision and monitoring. The guideline hopes to improve road performance and reliability, increase benefits to local residents, and maximize cost effectiveness.

5.5.5 Roadside Bio-engineering Reference Manual, DoR, GoN (1999 AD)

This reference manual provides background and supporting information and is developed with an intention to use it for office. The manual works in companion with Roadside Bio-engineering Site Handbook in providing relevant information for the use and application of roadside bio-engineering

5.5.6 Roadside Bio-engineering Site Handbook, DoR, GoN (1999 AD)

This handbook provides the information needed to design, plan, implement and maintain roadside bio-engineering works. It also covers the establishment and maintenance of bio-engineering nurseries. It is intended that the handbook cover all subjects that an engineer would need on site.

5.5.7 Roadside Geotechnical Problems: A Practical Guide to their Solutions, DoR, GoN (2007 AD)

The principal objective of this practical guide is to provide practical guidance on how to deal with geotechnical problems that affect roads under their jurisdictions. The guide addresses the need to involve at an early stage, when required, Department of Road (DOR) officials and engineers and in particular those from the Geo-environmental and Social Unit (GESU).

5.5.8 National Environmental Impact Assessment Guidelines 2050 BS (1993 AD)

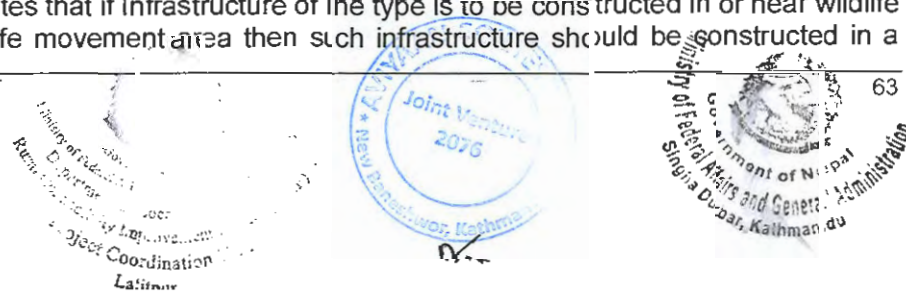
This guideline assists several mechanisms for identification of projects requiring EIA, processes selecting alternatives, and mitigation measures including monitoring and evaluation. The guideline provides important reference such as a checklist of environmental parameters, as well as numerous diagrams, tables and flow charts. The basic intent is to provide mechanism to optimize development benefits without degrading environmental quality and natural resources, and to integrate environmental considerations within the project planning cycle.

5.5.9 Guideline Related to Extraction, Sales and Management of Stone, Aggregates and Sand 2077 (ढुँगा, गिट्टी, बालुवा उत्खनन, बिक्री तथा व्यवस्थापन सम्बन्धी मापदण्ड २०७७)

This guideline has been prepared to ensure adequate amount of riverbed materials and at the same time curb uncontrolled exploitation of such materials for sustainable use and to manage royalty obtained from riverbed materials. The guide also provides local government practical ways to implement contract to collect riverbed materials.

5.5.10 Guidelines for Construction of Wildlife Friendly Infrastructure (2078 BS)

The guidelines states that if Infrastructure of line type is to be constructed in or near wildlife habitat or in wildlife movement area then such infrastructure should be constructed in a



wildlife friendly way for safety of wildlife, minimize accidents and minimize conflicts between human and wildlife.

Section 3 of the guideline states: infrastructure should be constructed outside the sensitive area. Section 4 states: pre permission need to be taken from concerned body during feasibility study. Section 5 states: Project should discuss and work in coordination with the concerned body during feasibility study. Section 6 states: The study of sensitive area should be carried out by technical team. Section 7 states: Detailed report with estimated budget should be prepared on the wildlife friendly structures. Section 8 states: Approved wildlife friendly structure need to be constructed. Section 10 states: about things not to do while constructing the wildlife friendly structure. The remaining section states about the maintenance of the structure and monitoring.

5.6 Standards

5.6.1 Nepal Road Standards 2070 BS (2014 AD)

The standard is to be applied for all road constructions in Nepal and apply mostly for non-urban roads. The requirements can be relaxed in some very difficult situations but in general, higher standards than the minimum stated needs to be aimed

5.6.2 Nepal Vehicle Mass Emission Standard 2069 BS (2012 AD)

The standard is applicable to two, three and four-wheeler vehicles which are operated by gas, diesel, and/or petrol. The project needs to adhere to the standard during and after the project.

5.6.3 National Ambient Air Quality Standards for Nepal 2069 BS (2012 AD)

Air Quality standard has set nine parameters for determining air quality, namely, Total Suspended Particle (TSP), PM10, Sulphur dioxide, nitrogen oxide, carbon monoxide, benzene, glass, PM2.5 and ozone. The project needs to adhere to the standards during and after the construction of the project.

Table 5-1: Recommended Ambient Air Quality Standards

| Parameter | Unit | Time | Max. | Method of Measurement |
|--|-------------------|------------------|-----------------------|--|
| | | Weighted Average | Concn. in Ambient Air | |
| TSP | µg/m ³ | Annual | | High Volume Sampling and Gravimetric Analysis |
| | | 24-hour* | 230 | |
| | | 8-hour | | |
| PM10 | µg/m ³ | Annual | | High Volume Sampler and Gravimetric Analysis, TOEM, Beta Attenuation |
| | | 24-hour | 120 | |
| PM2.5 | µg/m ³ | Annual | | Sampling Gravimetric Matrix |
| | | 24-hour* | 40 | |
| | | 8-hour | | |
| Oxides of Nitrogen (as NO ₂) | µg/m ³ | Annual | 40 | Cheiluminescence |
| | | 24-Hour* | 80 | Same as manual |
| | | 1-Hour | | |
| | | Annual | 50 | |

| Parameter | Unit | Time | Max. | Method of Measurement |
|-----------------------------------|-------------------|------------------|-----------------------|---|
| | | Weighted Average | Concn. in Ambient Air | |
| Sulfur Dioxide (SO ₂) | µg/m ³ | 24-Hour** | 70 | Ultraviolet Fluorescence method, West and Gaeke Method |
| | | 1-Hour | | |
| Ozone (O ₃) | µg/m ³ | 24-hour | | UV spectrophotometer |
| | | 8-Hour* | 157 | |
| | | 1-Hour | | |
| Carbon Monoxide (CO) | mg/m ³ | 8-hour* | 10,000 | Non-Dispersive Infra-Red (NDIR) method |
| | | 1-Hour | | |
| | | 15-minute | 100 | |
| Lead (Pb) | µg/m ³ | Annual** | 0.5 | High volume sampling followed by atomic absorption spectrometry |
| | | 24-Hour | | |
| | | 1-Hour | | |
| Benzene | µg/m ³ | Annual ** | 5 | Gas Chromatographic |

Note:

Annual arithmetic means of minimum 104 measurements in a year taken twice a week 24 hourly at uniform intervals

24 hourly values shall be met 95% of the time in a year. 18 days per calendar year the standard may be exceeded but not on two consecutive days.

Source: National Ambient Air Quality Standard, 2012

5.6.4 National Drinking Water Quality Standard of Nepal 2062 BS (2005 AD)

The standard limits physio-chemical parameters as well as micro-organisms present in drinking water.

5.6.5 Noise Level Standard of Nepal 2069 BS (2012 AD)

The standard limits and regulates noise level in industrial area, business area, rural area and urban areas, etc.

5.7 International Conventions and Treaties

5.7.1 Convention on International Trade in Endangered Species of wild fauna and flora (CITES 1973 A.D.)

The convention classifies species according to criteria where access or control is important (e.g., I - species threatened with extinction; II - species which could become endangered; III - species that are protected; E - Endangered; V - Vulnerable, R - Rare (CITES 1983). The project will have to minimize impacts to the CITES species as far as possible.

5.7.2 Convention on the Biological Diversity (CBD, 1992 A.D.)

The objectives of this Convention, to be pursued in accordance with its relevant provisions, are the conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of the benefits arising out of the utilization of genetic resources,

including by appropriate access to genetic resources and by appropriate transfer of relevant technologies, taking into account all rights over those resources and to technologies, and by appropriate funding.

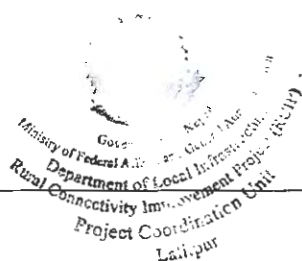
Under the Article 14 of the convention, each contracting party should introduce appropriate procedures requiring environmental impact assessment of its proposed projects that are likely to have significant adverse effects on biological diversity with a view to avoiding or minimizing such effects and, where appropriate, allow for public participation in such procedures.

5.7.3 ILO Convention 169

Convention 169 recognizes Indigenous peoples' right to self-determination within a nation-state, while setting standards for national governments regarding Indigenous peoples' economic, socio-cultural and political rights, including the right to a land base.

5.7.4 United Nations Framework Convention on Climate Change (UNFCCC) 1992

This convention was signed in order to stabilize the greenhouse gas (GHG) in the atmosphere. UNFCCC was first initiated in 1992 and was officially enforced since March 14, 1994. In Nepal it was enacted from 31st July 1994 and several activities on research and for awareness raising programs were conducted in order to popularize this convention. In order to accelerate the implementation of UNFCCC, Kyoto Protocol was brought forth and signed by the participating Nations. Nepal has responsibility to abide by the rules & regulations of the Convention. Although Road development is not generating GHG, project implementation in Nepal requires clearance of forest area. Clearing/ degrading of the forest area reduces the carbon sequestration Capability of the forest



6 ALTERNATIVE ANALYSIS

Alternative analysis has been considered as an integral part of IEE study, which had explored alternative ways of achieving the objectives. The aim of alternative analysis is to arrive at a suitable development option, which maximizes the benefits while minimizing the unwanted impacts to the environment.

The aim of the proposed road project is to upgrade the existing road and to improve the transportation network for the enhancement of safe and faster connectivity of different settlements with the BP Highway which ultimately connect with the city like Banepa and Kathmandu. The various alternatives to achieve the above project alternatives with minimum environmental degradation are discussed in the following sections.

6.1 Design and Construction Approach

In Nepal, there are two major ways for road design and construction, those are,

- Conventional Road construction approach
- Green Road construction approach

In conventional approach, heavy machineries and equipment, blasting, concrete structure with the application of bituminous surfacing, side drains, roads and culvert etc. are extensively applied.

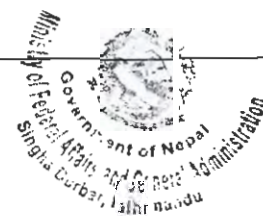
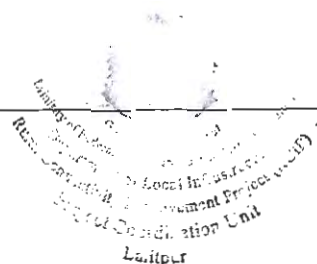
On the other hand, green road, which are normally referred as environment friendly, low cost, participatory, technically appropriate for fragile geological conditions of this country, labour based rural road construction and maintenance approach that focuses conservation of the delicate mountain ecology through the protection of vegetation cover as means of soil conservations, under this concept, majority of work will be performed manually. Blasting materials is discouraged in this approach and use of simple dry-stone walls and stone causeways is maximized.

The proposed upgrading work intended by RCIP is to be implemented through combinations of a conventional road construction with labour-based approach wherever possible. Bio-engineering will be used to stabilize slopes and reduce soil erosion. This is based on successful experience of green roads or rural roads implemented by various agencies in the past.

Considering the local situations, construction cost and maintenance requirement, this concept appears most suitable for the proposed project in terms of low cost for construction as well as maintenance. Local people will be benefited by availability of working opportunities on the project and earning in it.

6.2 Project Site

The alignment of the proposed road was finalized long time back and about 5-meter-wide road already exists. At this point of time, analysis relating to the alternate route with consideration of environment, construction cost, serviceability etc. is not relevant. However, it is understood that the alignment has been made after thorough investigation in terms of geology, hydrology, socio-economic and topographic aspects. This alternative is therefore not relevant.



6.3 Process, Time Schedule

While construction, rainy season and agricultural season should be avoided as far as possible because most of the local people will be engaged in the field. The construction period also should be sensitive to the periods of the utilization of natural drainage and waterways extensively by local farmers for irrigating their fields. Working during agriculture off-season is more important when the road is to be constructed by local labours. Construction activities on the road should also be done during day time and night time work should be avoided as far as possible. The proposed alternative schedule for execution of works will be pursued.

6.4 Raw Material to be Used

Physical resources consumed for the construction of proposed road will mainly involve Stones, gravels, sand, charcoal. These materials are available in nearby rivers and market. Regarding, human resource, it will be much better to involve local manpower for efficient and cost-benefit work conduction.

6.5 Others

6.5.1 No Action Alternative

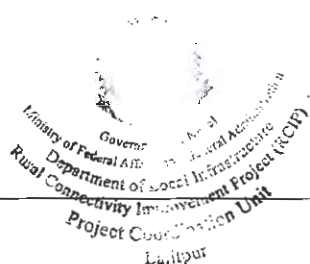
This alternative prevents the implementation of proposal, and therefore will forfeit the beneficial impacts identified. This proposal aims to improve links of wards of Sunapati RM, Khandadevi RM and Doramba Sailing RM with central city area enhancing rural accessibility, connectivity of rural people to nearby service centres, reducing travel time, ensuring travel safety and eventually increases the living condition of people living within zone of influence.

If proposal is discarded, and existing road prevails for longer duration with continuation of unsafe and narrow road, people living in this area will have to face travel hardship for longer duration. This alternative can prevent adverse impacts of road construction and operation for some duration however; there will be need of road upgrading in near future. Hence this alternative is regarded as irrelevant.

6.5.2 Alternative for Transportation

In order to fulfil similar requirements, alternative modes of transportation could be development of railway, rope way or air transportation.

People living within zone of influence of this subproject require safe and easy access to market Center, reduce travel cost and ensure accessibility for all. Above mentioned alternative modes of transportation fail to provide economic door-to-door connectivity and enhance regional transportation. *This alternative is therefore not relevant.*



7 IMPACTS OF THE IMPLEMENTATION OF THE PROPOSAL ON THE ENVIRONMENT

The proposed subproject may have both beneficial and adverse impacts. The identification and assessment of impacts has been carried out by considering the proposed activities in terms of construction and operation phases. The impacts have been predicted in terms of their magnitude of significance (minor, moderate and high), extent (site specific, local and regional) and duration (short, medium and long term). Most of the identified impacts have been quantified to the extent possible. The possible impacts from the proposal during the construction and operation phases are presented in the succeeding sections.

7.1 Beneficial Impact

Some of the beneficial impacts due to implementation of the proposal have been identified and assessed & enhancement measures for those impacts also have been suggested.

Following beneficial impacts are anticipated during construction phase:

7.1.1 Construction phase

7.1.1.1 Employment Opportunities and Income Generation

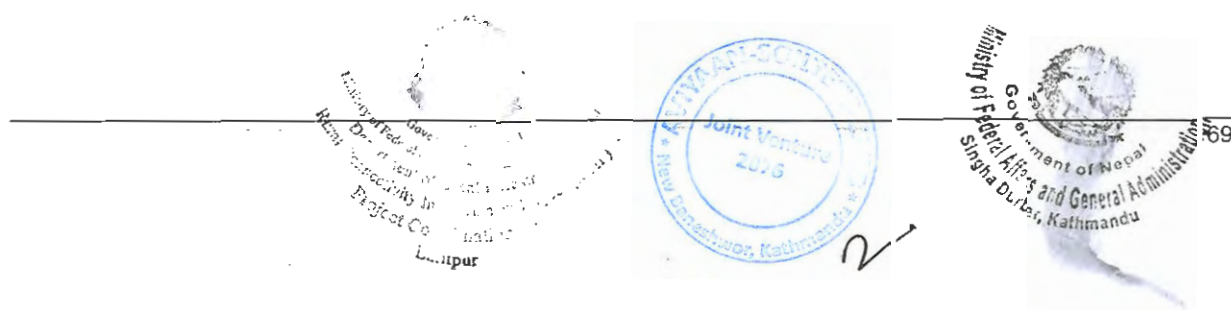
The Subproject offers a wide range of works for unskilled, skilled and semi-skilled labourers based on their qualifications and skills. Local people would generate substantial income from unskilled and semi-skilled job generated in the subproject. An estimated 229,324 man-days of unskilled workforce and 73,323 man-days of skilled workforce will be required for the subproject throughout the construction period. The impact is direct, high magnitude, local and short term in nature.

7.1.1.2 Skills Enhancement

The local people of concerned Rural Municipality (RM), wards and nearby community except getting employment will learn about the different construction techniques and skills. The subproject also supports in transfer of skills and technical know-how while working in construction works and inject capital in rural economy. These skills will benefit the locals in getting long-term employment opportunity in other road construction projects in future. The impact is indirect, medium magnitude, local and long-term in nature.

7.1.1.3 Enterprise Development and Commercialization

During the road construction period, different types of commercial activities will emerge in order to meet the demand of labour groups, construction crew and project team. For meeting these needs, enterprises like food and tea shops, groceries and restaurants will be developed for serving large numbers of people. Demand on the local production like pulses, milk, meat, vegetables, fruits etc. will increase which may provide added impetus for local production and marketing. Such benefits may contribute to enterprise development which often continues to entrench beyond construction period. This impact will be direct, of medium magnitude, local and long-term in nature.



7.1.1.4 Enhancement of the Local Economy

Different types of commercial and economic activities will come into operation during construction period in order to meet the demand of construction work forces. There will be regular demand for different types of food, beverage and other daily necessary items. To meet these demands, many local and outside people can operate a number of small shops and restaurants around the vicinity of the construction sites. Various farm-based enterprises including wide range of agricultural and livestock products will also gain momentum as a result of increased demand by labours during construction period. This will increase local trade and business in the area and provides opportunities for new income generating activities as well. The impact is indirect, medium magnitude, local and short term in nature.

7.1.2 Operation and Maintenance Phase

A number of beneficial impacts of the Proposal are anticipated during the operation phase, some of them are as indicated below.

7.1.2.1 Improved Access Facility and Economic Activity

An improved road access will bring in most if not all localities an improvement of food security situation, and will result in an overall economic and social stability. The travel time and travel cost will be saved significantly after upgrading of the proposed road. Similarly, the wear and tear of the vehicles will be less; and fuel consumption of the vehicles will also be less. In addition to this, good and reliable road links will increase access to markets, jobs, education, and health services. The road will provide safe and fast transport of goods and services from rural areas to urban centres and vice versa. This will bring about increase in productivity in rural areas and eventually improve the overall socio-economic condition of people living in or nearby road corridor. This will be direct, high magnitude, regional and long-term impact.

7.1.2.2 Enhancement of Quality of Life

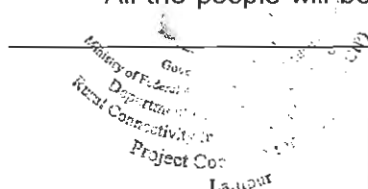
As a by-product of increase in productivity and subsequent increase in income levels from micro enterprises and by the gradual development of additional facilities and services in the area due to better access, it is expected that there will be an overall improvement in the quality of life of rural people with reduction in travel time to social services, market areas and traveling to other parts of the country. This impact is indirect, high magnitude, regional and long-term impact.

7.1.2.3 Enhancement of Social Services

With the improved access to inputs and better transport services upon completion of proposed road upgrading, other social services will also open up in the areas including education, health, communication, market, banking etc. With these services available and given its reliability assured, local stakeholders may look for and stick to locally available services rather than seeking it too elsewhere. This impact is indirect, high magnitude, regional and long-term in nature.

7.1.2.4 Women Empowerment

All the people will benefit from the road construction and upgrading. However, women in



particular may benefit more from improved access to the market centres and various services providing agencies like health centres, banks, training institutions, community development offices, etc. Frequency of visit to such agencies will increase awareness level and empower the women. This impact is indirect, medium magnitude, local to regional and long-term.

7.1.2.5 Appreciation of Land Value

One of the major benefits of the subproject is that the land price will be increased due to the availability of good transportation facilities. Upon completion of the present subproject, the potential business men will be attracted in the area for promoting their business. This impact is indirect, have high magnitude, local and long-term impact.

7.2 Adverse Impact

The potential impacts of the Proposed Road Subproject may be physical, biological and socio-economical in nature and can occur at various phases of the subproject such as construction phase and operation and maintenance phase. The magnitude of the impacts shall be small, moderate or high depending upon its severity and will be temporary or last permanently.

7.2.1 Socio-economic Environment

7.2.1.1 Preconstruction Phase

i. Land / Property Acquisition

There will be permanent acquisition of about 9.52 ha (Agriculture 2.67 ha and Land Forest 0.91) of land in addition to the existing road reserved. There will be no provision of compensation to private land,

Community Participation Plan (CPP) team carried out the socio- economic survey of the affected households whose land or properties lies within the formation width of the road alignment. The total number of affected land plots by the subproject is 750. Out of which, plots verified as private land is 509 plots (holding – 361 HHs) and plots unverified is 241 plots. The land to be acquired from verified plots and unverified plots are 7.93 ha and 4.63 ha respectively. Based on the land loss percentage in respective land plots majority 430 land plots will lose less than 10%, 221 land plots will lose between 10% – 20% and 99 land plots loose above 20%. The field survey did not identify severely affected HHs due to acquisition of land as they hold more than one land parcel. The number of affected private structure by the subproject is 25 (residential houses – 25 nos. and sheds/huts – 5 nos.). A temple at Ch. 1+550 is found to be affected by the subproject

This impact is expected to be of high magnitude, local in extent and long term in duration.

7.2.1.2 Construction Phase

i. Stress/ Impacts on Public Utilities and Facilities

The subproject affected public utilities are 112 electric poles and 3 water tanks.

Influx of labour force exerts pressure and competes on existing essential services including telephone, water supply, solid waste management, health services, transportation, school etc if its magnitude is not upgraded to suit and cater additional needs. This impact is indirect,



low magnitude, short-term and local in nature.

ii. Occupational Health and Safety, STDs and Nuisance from Construction Camps

As labour forces requires to undertake works especially in rock cutting, high slope cutting, hazardous materials handling, heavy equipment operations, bitumen works, tree felling, slope stabilization etc., they are exposed to various safety risks and health hazards if and when these works undertaken without adequate safety measures. Other potential impacts to health are respiratory, eye disease due to exposure to dust, emissions during pavement works especially in bitumen works. Health risk is also commonly associated with the poor labour camp conditions, use of unsafe water supply sources, poor sanitation conditions (lack of latrines and washing facilities) also cause the risk of endemic diseases that includes dysentery, diarrhoea, cholera, etc. Contagious diseases HIV/AIDS, STDs etc. may surface up conspicuously and spread over extensively as any one - local and in-migrant labour force infected with diseases- become sexually active. Impact is direct, high magnitude, regional and long term in nature.

iii. Social Conflicts due to Influx of Construction Workers

The amount of money that enters into the subproject area during construction phase as wage payment may induce local inflation. Increased income of local labours and construction crews of the contractor can lead to negative impacts such as spread of alcohol consumption and gambling. Influx of migrant workers also bears potential for Sexually Transmitted Diseases (STDs) such as HIV/AIDS. These impacts leading possibly to social and cultural conflicts will be direct, low in magnitude, local and short-term in nature.

7.2.1.3 Operation Phase

i. Possible Township Development and Likely Environmental Impacts along the Road Alignment

Settlements, shops, food stalls etc., emergence along the road-side soon after construction completion is common observation in Nepal. It surfaces up as the economic opportunities for the local people and to some in-migrant labour force. This leads to both appreciation in land value especially of those along and by the roadside and encroachment of public land by them, causing to becoming source of social conflicts associated with road accidents, road blockage, delays etc. Impact is indirect, low magnitude, local, and short-term in nature.

ii. Social Conflicts

Improvement of road conditions would result in increased number of persons using the road. There would be an increase in the number of trucks carrying goods and farm produce from various communities. This increase in the number of visitors in the area may influence the changes in the social behaviour. Truck drivers sleeping over in the communities are likely to solicit for sex with women and young girls in the communities hence increasing the risk of HIV/AIDS spread and teenage pregnancy cases. This will cause impact on social aspects including family breakdown and disease spread and ultimately affecting the traditional bonds, norms and functions of the community. Impact is indirect, low magnitude, local, and short-term in nature.

iii. Roadside Safety Issues

Fast driving temptation especially among the public transport drivers following road

upgrading to smooth road surface, may cause road accidents. These accidents are generally frequent occurring nature, which is associated with non-respect to speed limit and safety sign posts on the road stretches. In absence of especially exceeding speed limit Impact is indirect, high magnitude, local, and short-term in nature.

7.2.2 Cultural (Physical and Social)/Religious/Historical) Environment

i. Impact on Ancient Monuments, Historical Sites

The subproject will not affect any ancient monuments, historical sites.

7.2.3 Physical Environment

7.2.3.1 Pre-Construction Phase Issues

Following activities will be carried out during pre-construction phase of the subproject:

i. Relocation of Utilities

Proposed road upgrading subproject will cause disruption in some of the existing public utilities. These services include: electric poles (112) and 3 drinking water tanks. They are listed below and location map of public utilities to be relocated is illustrated in Figure 7-1.

Table 7-1: List of public utilities to relocate

| S.N. | Name of Public Utilities | Chainage |
|------|--------------------------|----------|
| 1 | Electric Pole | 0+030 |
| 1 | Electric Pole | 0+648 |
| 2 | Electric Pole | 2+602 |
| 3 | Electric Pole | 3+181 |
| 4 | Electric Pole | 3+852 |
| 5 | Electric Pole | 6+811 |
| 6 | Electric Pole | 6+848 |
| 7 | Electric Pole | 7+024 |
| 8 | Electric Pole | 7+231 |
| 9 | Electric Pole | 7+364 |
| 10 | Electric Pole | 7+441 |
| 11 | Electric Pole | 7+516 |
| 12 | Electric Pole | 7+607 |
| 13 | Electric Pole | 7+651 |
| 14 | Electric Pole | 7+685 |
| 15 | Electric Pole | 8+025 |
| 16 | Electric Pole | 8+074 |
| 17 | Electric Pole | 8+145 |
| 18 | Electric Pole | 8+251 |
| 19 | Electric Pole | 8+616 |

| SN. | Name of Public Utilities | Chainage |
|-----|--------------------------|----------|
| 20 | Electric Pole | 8+663 |
| 21 | Electric Pole | 8+665 |
| 22 | Electric Pole | 8+951 |
| 23 | Electric Pole | 9+209 |
| 24 | Electric Pole | 9+277 |
| 25 | Electric Pole | 9+418 |
| 26 | Electric Pole | 10+363 |
| 27 | Electric Pole | 10+364 |
| 28 | Electric Pole | 11+060 |
| 29 | Electric Pole | 11+489 |
| 30 | Water tank | 11+570 |
| 31 | Electric Pole | 14+390 |
| 32 | Electric Pole | 14+433 |
| 33 | Electric Pole | 14+456 |
| 34 | Electric Pole | 14+504 |
| 35 | Electric Pole (2 Nos) | 14+542 |
| 36 | Electric Pole | 14+607 |
| 37 | Electric Pole | 14+639 |
| 38 | Electric Pole | 14+820 |
| 39 | Electric Pole | 14+844 |

Initial Environmental Examination (IEE) of Lubughat-Galpa-Doramba Road, Ramechhap District

| S.N. | Name of Public Utilities | Chainage |
|------|--------------------------|----------|
| 40 | Electric Pole | 14+866 |
| 41 | Electric Pole | 14+898 |
| 42 | Electric Pole | 14+923 |
| 43 | Electric Pole | 14+948 |
| 44 | Electric Pole | 14+977 |
| 45 | Electric Pole | 15+092 |
| 46 | Electric Pole | 15+134 |
| 47 | Electric Pole | 15+183 |
| 48 | Electric Pole | 15+426 |
| 49 | Electric Pole | 15+429 |
| 50 | Electric Pole | 15+455 |
| 51 | Electric Pole | 15+544 |
| 52 | Electric Pole | 15+810 |
| 53 | Electric Pole | 16+260 |
| 54 | Electric Pole | 16+383 |
| 55 | Electric Pole | 16+411 |
| 56 | Electric Pole | 19+144 |
| 57 | Electric Pole | 19+308 |
| 58 | Electric Pole | 19+362 |
| 59 | Electric Pole | 19+387 |
| 60 | Electric Pole | 19+417 |
| 61 | Electric Pole | 19+456 |
| 62 | Electric Pole | 19+492 |
| 63 | Electric Pole | 19+551 |
| 64 | Electric Pole | 19+603 |
| 65 | Electric Pole | 21+514 |
| 66 | Electric Pole | 21+686 |
| 67 | Electric Pole | 22+020 |
| 68 | Electric Pole | 22+055 |
| 69 | Electric Pole | 22+071 |
| 70 | Electric Pole | 22+133 |
| 71 | Electric Pole | 22+140 |
| 72 | Electric Pole | 22+185 |
| 73 | Electric Pole | 22+186 |
| 74 | Water Tank | 24+260 |
| 75 | Electric Pole | 25+063 |
| 76 | Electric Pole | 26+834 |
| 77 | Electric Pole | 27+710 |

| S.N. | Name of Public Utilities | Chainage |
|---------|--------------------------|----------|
| 78 | Water Tank | 28+370 |
| 79 | Electric Pole | 29+528 |
| 80 | Electric Pole | 29+582 |
| 81 | Electric Pole | 30+091 |
| 82 | Electric Pole | 30+631 |
| 83 | Electric Pole | 30+660 |
| 84 | Electric Pole | 30+954 |
| 85 | Electric Pole | 31+019 |
| 86 | Electric Pole | 31+021 |
| 87 | Electric Pole | 31+064 |
| 88 | Electric Pole | 31+173 |
| 89 | Electric Pole | 31+225 |
| 90 | Electric Pole (2 Nos) | 31+226 |
| 91 | Electric Pole | 31+227 |
| 92 | Electric Pole | 31+276 |
| 93 | Electric Pole | 31+310 |
| 94 | Electric Pole | 31+359 |
| 95 | Electric Pole | 31+398 |
| 96 | Electric Pole | 31+448 |
| 97 | Electric Pole | 31+484 |
| 98 | Electric Pole | 31+511 |
| 99 | Electric Pole | 31+556 |
| 100 | Electric Pole | 31+665 |
| 101 | Electric Pole (2 Nos) | 31+929 |
| 102 | Electric Pole | 32+623 |
| 103 | Electric Pole | 32+654 |
| 104 | Electric Pole | 32+654 |
| 105 | Electric Pole | 32+683 |
| 106 | Electric Pole | 32+724 |
| 107 | Electric Pole | 32+988 |
| 108 | Electric Pole | 33+105 |
| 109 | Electric Pole | 33+369 |
| 110 | Electric Pole | 33+571 |
| 111 | Electric Pole | 33+639 |
| 112 | Electric Pole | 33+641 |
| Summary | | |
| 1 | Nos of Electric Poles | 112 |
| 2 | Nos of Water Tanks | 3 |

Source: Field Visit 2022

Proper co-ordination among relevant service providers in advance will be done during

Ministry of Federal Government
Department of Rural Connectivity
Project Coordination Unit
Lalitpur



Ministry of Federal Government
Department of Federal Affairs and General Administration
Singha Durbar, Kathmandu

shifting of utility services. Advance notice to the public about the times that the utility services will be disrupted will help the public to adjust to the situation before hand, thereby minimize the difficulties that they will face in the case of sudden disruption of these services.

ii. Clearance of Land

Storage yards, disposal sites and labour camps will be established. The identified location for camp site and parking lot are 14+400 and 26+500. Similarly, the identified location for storage yard is 14+550. These activities will require acquisition of land which is expected to result the followings:

- conflicts with local communities for acquisition of lands,
- disposal of spoil will result in soil erosion and land instability,
- removal of vegetation as a part of site clearance will result in loss of vegetation and trees

iii. Identification and Selection of Material Sources

It will be the construction contractor's responsibility to verify the suitability of all construction material sources and quarries which will require approval of concerned local bodies. The identified quarry sites are tabulated in Table 4-7. The quarrying will result in

- Loss of vegetation and trees
- Since the quarrying will be carried out in the hilly slope, possibility of slope failures will be expected.
- Quarrying will also be carried out from local river beds and banks.

iv. Identification of Designated Waste Disposal Locations

Unplanned spoil disposal is one of the sources of environmental impact of the road construction. These will result in

- Blockage of natural drainage results in water logging and slope failure due to water saturation;
- The disposed of spoil can enter into the cultivated land that can result in loss of fertile top soil in farmlands, loss of crop productivity;
- Similarly, the vegetation of surrounding area might also be disturbed by the spoils.

During pre-construction phase, designated spoil disposal sites should be identified. These sites will include

- proper firm and stable terracing design to accommodate spoil;
- specify the quantity of spoil that can be accommodated in a particular spoil disposal site;
- proper drainage should be designed to avoid erosion and slope failure in the site as well as reduce siltation to the water bodies and cultivated lands. The Probable spoil disposal sites were identified at Sunkoshi River beach (6 km from 5+500), 25+200 (Galpa), 29+800, 29+900 and 31+000. The location map is provided in appendix 3. Local people are also interested providing their land for filling their low land with disposal of muck.

v. Stockpiling of Construction Materials

From the past experience, we have observed that the contractors stockpile constructions



materials like gravels, rock aggregates, bricks, cement, etc. in the site that are near to the road alignment for convenience without proper protection. As a result of which agricultural land, forest land or other private property might get contaminated by the stockpiled materials. This is also loss for the contractors. Therefore, the stockpiling of construction materials shall be done with preventive measures such as enclosures, covering of stockpiles, etc.

7.2.3.2 Construction Phase

i. Earthworks/Slope Instability

Soil erosion as well as landslides problems may arise due to removal of vegetation and excavated soil with exposed soil to rain during construction. This will be a major source of silt that the monsoon runoff carries away. The stability of slopes along the road corridor depends upon slope angle, the material constituting the slope, rock discontinuities and hydrological conditions. We have identified possible two locations at chainages 3+300 and 7+500 with possibility of instabilities. The degree of sliding increases during the road excavation and it may cause regular sliding during operational phase. The impact will be direct, of low magnitude, site specific and short term in nature.

ii. Loss of Top Soil

Loss of top soil creates commonly long-term impacts along roads due to (i) site clearance and widening for road formation; (ii) temporary construction activities such as construction camps, material storage locations, diversion routes etc. Proposed upgrade work increases the paved surface and permanent loss of top soil under these civil construction activities. Excavation for forming the drains also involves loss of top soil as well as scarifying the surface with construction machinery and equipment. These sites shall be confirmed during the detailed project planning phase. The emphasis shall be given on the followings:

- minimizing removal of trees from these sites;
- preservation of top soil by collecting them and properly stockpiling;
- rehabilitate the temporary site after completion of construction by (i) regarding of the slope to minimize steep slope gradient, (b) relaying the stockpiled top soil and (c) re-vegetation (plantation).
- Impact is predicted as direct, of low magnitude, site-specific and short term in nature.

iii. Change in Land Use

About 2.67 ha of agricultural and 0.95 ha of forest land is required for the implementation of road upgrading subproject. As the alignment will be widen, the land use pattern will be changed drastically. After the construction of the road alignment, nearby forest and grass land will be changed to settlement area. Therefore, significant landscape impacts are expected from construction of the road. These impacts will be of direct, site specific, high in magnitude, and long-term in nature.

iv. Disruption of Public Utilities

The existing public utilities and services located within the road width along the alignment will be affected by the proposed road upgrading. These will require removal/relocation, extension, reinstatement, demolition and construction depending upon their function and

necessities.

v. Traffic Hazard and Road Safety

Since the work is conducted on existing road with less traffic and passing through forest areas, the general public and traffic will have less possibility to come in close contact with the construction areas, and there is no potential risk to public.

vi. Impact due to Establishment of Construction Camps

Contractor will establish camp if he brings labours from outside the area. Siting of camp will cause encroachment of agriculture land and alteration of drainage, solid waste and waste water problems. Impacts anticipated from construction camp establishment and operation include disposal of solid waste (organic waste, plastic and metal scrap, wastewater etc.), pressure on public facilities (drinking water sources, markets, health facilities, schools, etc.), impairment of aesthetic value of the landscape (loss of vegetation, compaction and contamination of soil and land), poor sanitation (unhygienic latrine, poor drainage facility), transmission of communicable diseases (sexually transmitted diseases, vector borne diseases, etc.), poor water supply, use of alcohols, gambling and conflict with local communities. Impact will be direct, medium magnitude, site specific and short-term.

vii. Impact due to Operation of Quarries

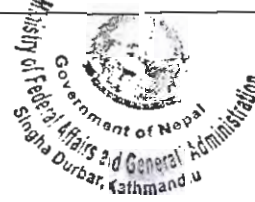
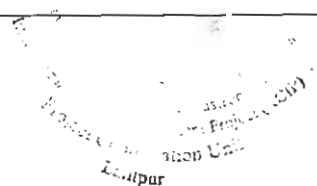
Large amount of construction materials such as boulders, sand and aggregates are required for pavement, retaining wall, breast wall, gabion wall and other structures. These materials will be obtained from approved quarry sites. The extraction of materials from inappropriate places or in excessive amount can seriously damage the local environment. For example, quarrying from a high slope and fragile area can result slope instability, extraction of sand and gravel in excessive amount from river can cause riverbank cutting and erosion and changes in river regime. It may cause landslide, erosion or box cutting of agriculture land, impact on sensitive environmental areas etc. Impacts from quarrying will be of direct, medium magnitude, site-specific and long-term in nature.

viii. Impact due to Stockpiling of Construction Material and Spoil/Debris Disposal

Construction material storage site pose adverse impact during construction phase. Erosion from stockpiled material will cause water pollution, land value degradation, loss of initial agricultural productivity, and nuisance. This impact is direct, low in magnitude, site specific and short term in nature. A total of 519,873 Cum of spoils are generated during the excavation of the road. Unmanaged disposal of spoil may cause blockage of natural drainage systems, loss of organic fertile top soil and farmlands, crops and forest, water logging. During site clearance, excavation in slope, foundation of structures will be generated huge debris. The locations for the spoil disposal sites are included in 7.2.3.1iv. If this debris is not properly disposed significant negative impacts are anticipated on public health and safety and scenic beauty of the subproject area. The impact is direct, medium magnitude, site specific and short term in nature.

ix. Obstruction to Natural Drainage Pattern

Potential blocking of river crossing and natural drainage from road construction especially during the construction of embankments, shoulders, re-construction/repairing of culverts etc is envisaged. This could create temporary inundation of areas closer to the above locations



during rainy season. Impact is direct, of low magnitude, site-specific and short term in nature.

x. Air, Noise, Vibration and Water Pollution

Dust will be major problem during both the construction and operation of the road. The subproject area at present does not experience higher levels of noise pollution. However, during construction, the increased construction activities may increase the noise level to some extent. The water quality in the subproject area appears to be clean and not polluted. During construction these water bodies may get polluted by spoil and construction wastes. The anticipated impacts on air, noise and water pollution will be direct, low magnitude, local and short term in nature.

7.2.3.3 Post Construction Phase

i. Dismantling of Camp Site and Camp Site Restoration

Camp site results in change of land use due to setting up of construction camp and waste generation at the construction site. The contractor is required to properly remove all temporary structures built for operation of construction and workers camps. While doing so, the land will be brought back to original state. The impact is predicted to be direct, of medium magnitude, confined to construction area, and short-term.

ii. Clearing of Water Channels, Side Drains and Culverts

During construction, water channels, side drains and culverts will be disturbed or filled with construction debris and silt. Contractor shall ensure that these will be cleared after the construction activities are over.

7.2.3.4 Operation Phase

i. Impacts due to Slope Instability

During the operation phase unstable slopes could be destabilized due to monsoon rain, inadequate and improper drainage works, faulty construction and inadequate vegetative measures. The stability of slopes may also be affected by human activities in the road neighbourhood such as animal grazing and tethered cattle along road edge. The impact will be direct, medium magnitude, local and long term in nature.

ii. Right of Way Encroachment

Encroachment of RoW can take place at any time after completion of construction works and this practice is common all over the country; mainly for income generation activities. The permanent or temporary structures built by encroachers within existing reservation cause impact on the pavements and road side drains. They also obstruct maintenance activities of the roads, view range of travellers and impact to the movement of pedestrian. Parking of vehicles opposite to these locations for buying foods (vegetable, fruits), as well as for other services will increase accidental damage to vehicles and other road users. The impact will be direct, medium magnitude, local and long term in nature.

iii. Drainage and Water Management

Sediments could block drain, culverts and other cross drainages, improper disposal of debris or disposing garbage into those structures will create overflow of drains and alter surface runoff paths causing soil erosion and health hazards. This will also induce siltation in nearby stream which can trigger floods as well as affect aquatic flora and fauna.

Impacts will be indirect, of medium magnitude, local and long-term in nature.

iv. Air and Noise Pollution

The source of air pollution in this area will be the exhaust from the vehicles using fossil fuels and vehicle fumes from any other fuel powered mechanical equipment. This will result in the degradation of air quality. It is common practice in Nepal for pressure horns to be used. This is likely to increase the noise level and it may affect human beings and livestock.

The impacts associated with this will be of direct nature, medium in magnitude, locally confined and long term in nature.

7.2.4 Biological Environment

7.2.4.1 Pre-construction Phase Issues

i. Tree Felling

Total of 451 trees lies in formation width within road side, private forest and community forest (Sunapati Salleni Community Forest, Sunapati Sarvajhang Kiprug Community Forest, Phalam Pokhari Community Forest, Chandramukhi Community Forest, Suryamukhi Community Forest, Gairi Danda Kabulyat Forest, Ratmate Community Forest, Gothe Danda Karyangmaryang Community Forest, Jhopsing Khola Kabulyat Forest, Bhumithan Community Forest) which need to be felled. Hence prior clearance shall be taken from concerned department and ministry.

7.2.4.2 Construction Phase

i. Clearing of Forest Land and Trees, Shrubs and Herbs and Habitat Disturbance

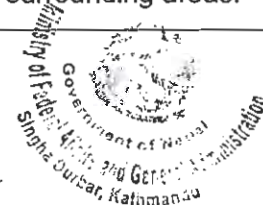
The existing track has a width of about 5 m which will be extended to about 8.2 m (including shoulder and side drain) within a RoW of 20 m. So, 0.91 ha of the forest area will be cleared for the formation width of the road section. It will be inevitable that during the widening of the proposed road, establishment of the camp site, opening up of quarry areas and construction of access routes to the quarry there will be need to clear all vegetation within the designed subproject area along the entire stretch of the proposed road. The impact will be direct, medium magnitude, local and long term in nature.

ii. Habitat Fragmentation or Loss and Barrier to Wildlife Movement Corridor

As reported by the locals, wild life is occasionally seen in the project area. The road alignment is the upgrading of the existing road. So, wild life habitat will not be fragmented. There are only two minor crossings in this road section at Ch. 1+290 and Ch. 17+210. A special wildlife friendly infrastructure may not be applicable for these sections. A slab culvert of 5m span is proposed in these sections. So, wildlife movement will not be disturbed.

iii. Use of Forest Product by Construction Workers and Construction Activities

Labour force and workforce unless their energy needs for their meal cooking is met from fossil fuel, may exert pressure on the local forests of the surrounding areas.



The impact will be indirect, of low magnitude, local and short term in nature.

iv. Damage of Aquatic Habitats

Erosion from poorly constructed and rehabilitated sites can lead to downstream siltation, ruining spawning beds for fish. Constrictions of flows at water crossing can make the current too fast for some species. Disposal of excavated materials on water bodies may increase turbidity of water and result in reduction in dissolved oxygen content. It is common to see the inappropriate driver practices connected with vehicle washing in streams and rivers which can cause local water pollution by leakage of fuel, lubricants and hydrocarbons that may not only affect the aesthetic value of the water body, but also may hazard users of those drinking water sources.

The impact will direct, low magnitude and local and medium term in nature

v. Disturbance of Biodiversity and Wildlife

Though the wildlife population is reported low in the subproject area, construction workers may use firewood for cooking and engage in hunting of wildlife.

The impact will be indirect, low magnitude, local, and of short term in nature.

7.2.4.3 Operation Phase

i. Impacts on Forest Resources

The pressure on forest and forest resources during operation phase will result indirectly from the improved public/vehicular access to forest lands. Undesired cumulative and induced impacts may include accelerated logging, illegal extraction of timber and other forest products, incidental forest fires, and the introduction of invasive species (weeds, pests). The impact will be indirect, of medium magnitude, local and medium term in nature.

ii. Wildlife Disturbance

Upon proposed road upgraded and open to public transportation and others, increased traffic flow may cause disturbance to wildlife and their movements on road stretch crossed by natural forests. This in combination with fast driving (especially during night time) and or in combination with relentless honking over the stretch harbouring wildlife may pose further risks to their natural succession. These may have far-reaching consequences leading to its population decimation and at worst to its extinction. The subproject area has a sparse population of wildlife. Impact is indirect, low magnitude, local, and long-term in nature.

7.2.5 Chemical Environment

7.2.5.1 Pre-Construction Phase Issues

i. Use and Storage of Fuel, Lubricants, Oils, Acids, and Other Chemicals for Construction

Putting mechanical workshop, fuel depot etc. into operation at contractor's camp in order to ensure upkeep of all vehicles, operating machines including heavy ones deployed in proposed road upgrading requires use of substantial quantity of lubricants, vehicles refuelling etc., to keeping it in functional upkeep works; refuelling etc. also generates some wastes and spillage. Acids used in battery recharging, other chemicals etc. used at workshop are another type of workshop wastes. Fossil fuel is also required in operating

heavy construction equipment. Whilst its safe storage and usage is required and ensured, workshops wastes are potential source of environmental hazards unless it is handled correctly. Impact is indirect, medium magnitude, local, and short-term in nature.

7.2.5.2 Construction Phase

i. Use of Fuel, Lubricants, Oils, Acids, and Other Chemicals for Construction

Storage and use of petrol, diesel, oil and lubricants including disposal of used oil, lubricants and solvents may invite explosion hazard, ground and surface water pollution resulting runoff from spills/leaks and improperly discarded used oil and lubricants. The anticipated impact will be direct, of low magnitude, local and short term in nature.

ii. Use and Storage of Chemicals like Bitumen, etc.

The proposed subproject consists of blacktopped pavement which will require safe storage and use of bitumen. Use of fire wood to heat bitumen and release of bitumen and smokes into environment (runoff of bitumen into surface waters) and pollute air quality are the potential impacts likely to occur if handled inappropriately. Bitumen, which is to be used in sealing of proposed road upgrading, is highly combustible and risky of fire hazards unless it is kept away from the fire igniting source as well as from the public insecurity. Hence its storage prior to usage in sealing works is of key concern during road sealing works, and need to be of adequately safe condition in storage. It causes severe burns if handlers skin gets in touch with it, and is also severely toxic to naked eyes. Impact is indirect, medium magnitude, site specific and short term in nature.

7.2.5.3 Operation Phase

i. Effect on Water Quality

The practices connected with car/truck washing in streams and near wells and springs has the potential to cause local water pollution by leakage of fuel, lubricants and hydrocarbons that may not only affect the aesthetic value of water bodies but also have detrimental effects on the health of people and animals relying on these sources. The impacts associated with this will direct, low in magnitude, locally confined and long-term.

7.3 Impact Analysis

Numerical Scale mentioned in National EIA Guidelines (1993) is used to analyze the impact of the proposed subproject. The numerical scale is presented in table below.

Table 7-2: Impact Evaluation Matrix

| Magnitude | | Extend | | Duration | |
|------------|----|--------------------|----|------------------|----|
| High (H) | 60 | Regional (R) | 60 | Long term (LT) | 20 |
| Medium (M) | 20 | Local (L) | 20 | Medium Term (MT) | 10 |
| Low (L) | 10 | Site Specific (SS) | 10 | Short Term (ST) | 5 |

The combine score below 40 shall be termed as insignificant impact (IS); scores ranging between 40 and 79 shall be termed as significant impact (S), scores ranging between 80 and 99 shall be termed as very significant (VS) and the scores above 100 shall be termed as highly significant impact (HS).

Table 7-3: Beneficial Impacts

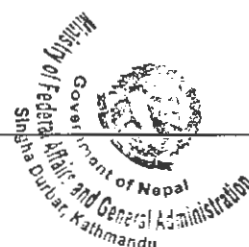
| Aspect | Impact | Nature | Magnitude | Extent | Duration | Rating |
|----------------|--|----------|-----------|--------|----------|--------|
| Socio Economic | Construction Stage | | | | | |
| | Employment opportunities and income generation | Direct | H 60 | L 20 | ST 5 | VS 85 |
| | Enhancement of the Local Economy | Indirect | M 20 | L 20 | ST 5 | S 45 |
| | Skill Enhancement | Indirect | M 20 | L 20 | LT 20 | S 60 |
| | Enterprise Development and Commercialization | Direct | M 20 | L 20 | ST 5 | S 45 |
| | Operation and Maintenance Stage | | | | | |
| | Improved Access and Economic Activity | Direct | H 60 | R 60 | LT 20 | HS 140 |
| | Enhancement of Quality of Life | Indirect | H 60 | R 60 | LT 20 | HS 140 |
| | Enhancement of Social Services | Indirect | H 60 | R60 | LT20 | HS140 |
| | Woman Empowerment | Indirect | M 20 | L20 | LT20 | S60 |
| | Increase land value | Indirect | H 60 | L 20 | LT 20 | HS 100 |

Table 7-4: Adverse Impacts

| Aspect | Impact | Nature | Magnitude | Extent | Duration | Rating |
|-----------------------------------|--|----------|-----------|--------|----------|--------|
| Socio-Economic Environment | Construction stage | | | | | |
| | Stress on Public Utilities and Facilities | Indirect | L 10 | L 20 | ST 5 | IS 35 |
| | Occupational health and safety of workers | Direct | H 60 | SS 10 | LT 20 | VS 90 |
| | Social Conflicts | Direct | L 10 | L 20 | ST 5 | IS 35 |
| | Operational stage | | | | | |
| | Pressure on social services and facilities | Indirect | L 10 | SS 10 | MT 10 | IS 30 |
| | Social Conflicts | Indirect | L 10 | L 20 | ST 5 | IS 35 |
| | Roadside safety issues | Indirect | H 60 | L 20 | ST 5 | VS 85 |
| Physical and Chemical Environment | Construction stage | | | | | |
| | Earthworks/Slope Instability | Direct | L 10 | SS 10 | ST 5 | IS 25 |
| | Loss of top soil | Direct | L 10 | SS 10 | ST 5 | IS 25 |
| | Change in land use | Direct | H 60 | SS 10 | LT 20 | VS 90 |
| | Impact due to establishment of construction camps | Direct | M 20 | SS 10 | ST 5 | IS 35 |
| | Impact due to operation of quarries | Direct | M 20 | SS 10 | LT 20 | S 50 |
| | Impact due to stockpiling of construction material and spoil/debris disposal | Direct | M 20 | SS 10 | ST 5 | IS 35 |

| Aspect | Impact | Nature | Magnitude | Extent | Duration | Rating |
|-------------------------------|---|----------|-----------|--------|----------|--------|
| | Obstruction to natural drainage pattern | Direct | L 10 | SS 10 | ST 5 | IS 25 |
| | Air, Noise, vibration and Water Pollution | Direct | L 10 | L 20 | ST 5 | IS 35 |
| | Operational stage | | | | | |
| | Impacts due to slope instability | Direct | L 10 | SS 10 | MT 10 | IS 30 |
| | Right of Way encroachment | Indirect | M 20 | L 20 | LT 20 | S 60 |
| | Drainage and Water Management | Indirect | M 20 | L 20 | LT 20 | S 60 |
| | Air and Noise Pollution | Direct | M 20 | L 20 | LT 20 | S 60 |
| Biological Environment | Construction stage | | | | | |
| | Clearing of forest land and trees, shrubs and herbs and habitat disturbance | Direct | M 20 | L 20 | LT 20 | IS 60 |
| | Habitat Fragmentation or loss and Barrier to Wildlife Movement Corridor | Indirect | L 10 | L 20 | ST 5 | IS 35 |
| | Use of forest product by construction workers and construction activities | Indirect | L 10 | L 20 | ST 5 | IS 35 |
| | Damage of Aquatic Habitats | Direct | L 10 | L 20 | MT 10 | S 40 |
| | Disturbance of Biodiversity and Wildlife | Indirect | L 10 | L 20 | ST 5 | IS 35 |
| | Operation stage | | | | | |
| | Impacts on forest resources | Indirect | M 20 | L 20 | MT 10 | S 50 |
| | Wildlife disturbance | Indirect | L 10 | L 20 | LT 20 | S 50 |
| Chemical Environment | Construction stage | | | | | |
| | Use of fuel, lubricants, oils, acids, and other chemicals for construction | Direct | L 10 | L 20 | ST 5 | IS 35 |
| | Use and Storage of chemicals like bitumen etc. | Indirect | M 20 | SS 10 | ST 5 | IS 35 |
| | Operation stage | | | | | |
| | Effect on water quality | Direct | L 10 | L 20 | LT 20 | S 50 |

Most of the beneficial impacts during construction have high rating indicating positive outcome of the subproject implementation. Increase in income generating activities during construction holds highest rating and social benefit during operation has high rating value with weightage over 100. The loss of land and property; health and safety issues of labours and locals; clearance of forest land; slope instability and air pollution are the adverse impacts during construction phase. Mitigation measures need to be adopted to avoid, minimize or correct the adverse impacts during the pre- construction, construction and operation phases.



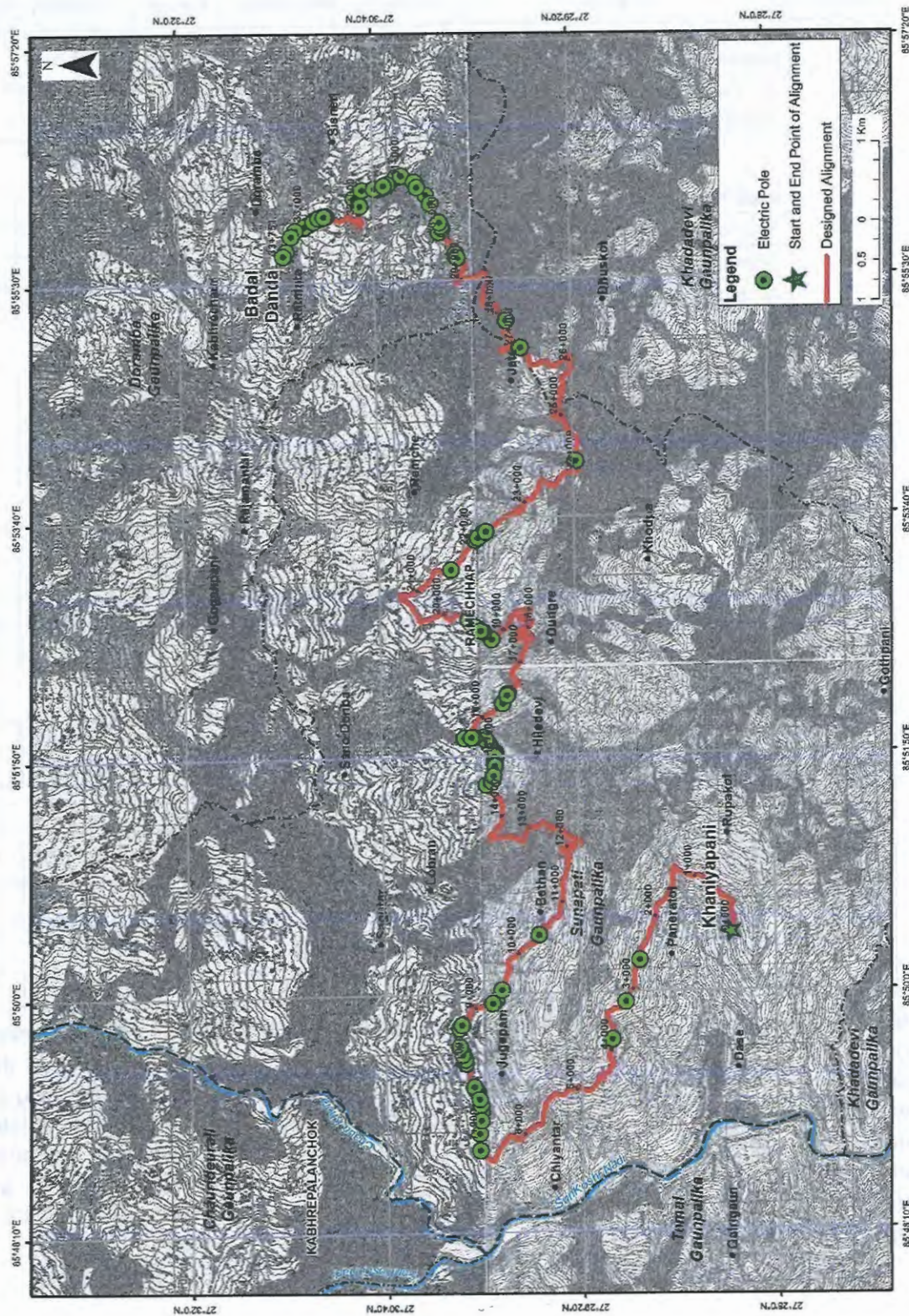


Figure 7-1: Location of public utilities to be relocated within Road Alignment

Ministry of Federal Affairs and General Administration
Government of Nepal
Singha Durbar, Kathmandu

Ministry of Federal Affairs and General Administration
Government of Nepal
Department of Local Infrastructure
Rural Connectivity Improvement Project (RCIP)
Project Coordination Unit
Lalitpur

Joint Venture
2076
New Daneshwari, Kathmandu

Singha Durbar, Kathmandu

8 MEASURES TO REDUCE OR CONTROL THE IMPACT OF IMPLEMENTATION OF THE PROPOSAL ON ENVIRONMENT

An effective implementation of benefit augmentation measures and adverse impacts mitigation measures would optimize the benefits expected from the subproject and avoid/minimize the adverse impacts from the subproject. Based on the impact assessment and identification, beneficial augmentation and adverse impact mitigation measures are presented in this chapter.

8.1 Benefit Augmentation Measures

8.1.1 Construction Phase

8.1.1.1 Employment Opportunities and Income Generation

A total of 229,234 man-days of unskilled and 73,323 man-days will be required during the construction of the subproject. Emphasis will be given to employ local community people in construction. The subproject will employ local poor, vulnerable and socially excluded people (Janajati, Dalit) and women to the extent possible, without gender discrimination.

The Livelihood Improvement and skill enhancement training will be provided for peoples from vulnerable households as well as the significantly affected households. The participants will be selected during the implementation of the Resettlement Plan through a needs assessment of the participants

8.1.1.2 Upgrading of Local Labour Skills in Road Construction

During the road upgrading works, the local labour will receive manifold skill training in construction techniques, small engineering structures and bio-engineering works. They also will receive additional knowledge in waste management, material handling and general application of environmental health and social precautionary measures. By augmenting their capacity, local people being involved in the Subproject will find it easier to find skilled manpower jobs in the future, thus securing their livelihood as an alternative/additional occupation to agriculture.

8.1.1.3 Enterprise Development and Commercialization

Different types of commercial activities will come into operation in order to meet the demand of labour groups, construction crew and project team. In general, the enterprises will include food and tea shops, groceries, lodges and restaurants for serving large numbers of people. The demand for local products such as pulses, vegetables, fruits, etc. will rise during the construction period which may provide added drive for local production and marketing. This will contribute to the local economy and may help reduce peri-urban poverty. Such benefits may contribute to enterprise development which often continues to entrench beyond the construction period.

8.1.1.4 Local Scale Enterprises Establishment and Enhancement

The benefit augmentation measures will include providing support to local entrepreneurs, promotion of cooperatives and linkage with bank and other financial institutions.



8.1.2 Operation and Maintenance Phase

8.1.2.1 Improved Access Facility

The upgraded road provides the easy, comfortable and improved access to the people. This will enhance the economic status of people. The benefit augmentation measures will be proper maintenance of the road during OLP period and after OLP period. Proponent will undertake regular maintenance of the road.

8.1.2.2 Enhancement of Quality of Life

As a by-product of increase in productivity and subsequent increase in income levels from micro enterprises and by the gradual development of additional facilities and services in the area due to better access, it is expected that there will be an overall improvement in the quality of life of rural people with reduction in travel time to social services, market areas and traveling to other parts of the country.

8.1.2.3 Enhancement of Social Services

As a by-product of increase in productivity and subsequent increase in income levels from micro enterprises and by the gradual development of additional facilities and services in the area due to better access, it is expected that there will be an overall improvement in the quality of life of peri-urban people with reduction in travel time to social services, market areas and traveling to other parts of the country. RCIP will maintain the road section through its regular maintenance program.

8.1.2.4 Women Empowerment

As the road construction activities requires large number of local people as skilled, semiskilled and unskilled labours. The employment emphasis will be given to the women as a part of benefit augmentation measure imparted by the road subproject. While selecting participants for different training special consideration will be given to women and at least 33% of the total participants will be women.

8.1.2.5 Increased Economic Activity with Improved Transport

This beneficial impact could be augmented by increasing production of local products such as cereals and cash crops like vegetables and fruits. Periodic and routine maintenance of the road should be properly streamlined.

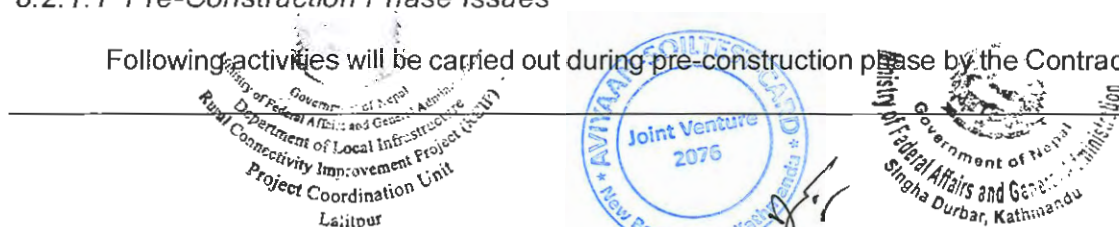
8.2 Adverse Impact Mitigation Measures

The mitigation measures adopted during construction phase are of preventive nature with two basic objectives: (i) avoiding costly mitigation, and (ii) increasing awareness among the stakeholders for environment protection while constructing and operating infrastructure services.

8.2.1 Physical Environment

8.2.1.1 Pre-Construction Phase Issues

Following activities will be carried out during pre-construction phase by the Contractor in co-



ordination of executing agency and their representative after getting the letter to proceed with the work execution.

Table 8-1: Environmental Concerns during Pre-construction Phase

| S.N. | Activity | Mitigation Measures |
|------|--|--|
| 1 | Relocation of utilities | Identification of relocation sites in advance with the consultation with locals and concerned authorities. |
| | | Scheduling of the activities concerning different utilities with the convenience of usage pattern |
| 2 | Tree felling | Compliance with Forest Act, 2076 if trees are on forest land and co-ordinate with Division Forest Office (DFO) and Community Forest User Groups (CFUGs). |
| | | Number of trees required to be felled down will be tagged |
| | | The tree felling will be done in participation of DFO. |
| | | Compensatory plantation at a ratio of 1:10 for trees from community forests. |
| 3 | Clearance of land | The following steps will be taken to minimize the associated impact with land clearing operations. |
| | | The land clearing operation will be undertaken as per the defined road alignment and community structure, utility and road furniture shifting plan. |
| | | The road land width will be clearly demarcated on the ground in consultation with affected communities and concurrence of the communities |
| | | Tree felling will be limited to those, which could not be saved even by design measures. The tree will be cut with a permission of Department of Forests and Soil Conservation. The vegetable cover will be removed and disposed in consultation with community. |
| | | All public utilities will be shifted with a concurrence of respective agencies/authority and to the adjacent location approved by them. The top soils will be collected and preserved for reuse as a base for turfing and grass plantation of embankment slopes. |
| 4 | Diversion of forest land | No loss of rare endangered or threatened species of flora is envisaged due to road side tree clearance. |
| | | The mandatory compensatory plantation will be done on 1: 10 bases by the Department of Forests and Soil Conservation /Division Forest Office |
| 5 | Location of storage yards, labor camps, and construction sites | Location criteria to be adopted. |
| | | Obtain clearances from local government bodies. |
| | | Infrastructure arrangements to be as per guidelines. |
| 6 | Procurement of equipment and machinery | Machinery to be procured will be in conformance with noise and emission standards of GoN. |
| | | Safety equipment for workers will be procured. |
| 7 | | Consultations and arrangements at contractor-individual levels, documentation of agreement. |

| S.N. | Activity | Mitigation Measures |
|------|---|--|
| | Identification and selection of material sources | Precautionary measures during siting of quarry areas. |
| | | Avoidance of location of material sources in Natural Habitats. |
| 8 | Identification of designated waste disposal locations | Site selection in conformance to criteria provided. |

8.2.1.2 Construction Phase

i. Slope Stabilization

Slope Stabilization Work Will Require Both Preventive and Corrective Approaches.

- Two unstable slopes identified along the alignment at Ch. 3+300 and Ch. 7+500. Retaining structures such as toe protection walls and drainage coverage to avoid direct interaction of draining water to the slope will be applied to these slopes. Road side drain and cross drainage structures are provided sufficiently so that the drain water are outlet at the pre-identified location. For the sustainability of the initiative these slopes are recommended to bio-engineering or grass and shrub plantation. Plantation of rooted grass slips, planting of single node culm, brush layering, grass turfing, plantation of medium shrubs like Amliso. The details of bio-engineering are included in appendix 12;
- Preventive measures will also be applied to prevent slope failure and erosion to be induced by the road construction, such as gentle slope gradient in the slope that are cut, or apply protection walls; exposed slopes shall be vegetated; avoid disposal of spoil down the hill by disposing the spoil only in the designated sites;
- In case of landslide and other calamities, Emergency Preparedness will be required. A trained team shall be made ready for any time for rescue and clearance of the side to reduce the effect of calamities. Similarly, all the workers will be trained for such situation.

ii. Conservation of the Top Soil

Top soil will be preserved by either stockpiling it adjacent to the proposed road formation batter sides, either immediately upslope or downslope of the extent of works, or by stripping it from the road section about to be excavated and re-spreading it immediately onto the previously completed adjacent section of road.

The preferred method is top soil stripping and re-spreading immediately. This has the advantages of only single handling the material and using topsoil when it is fresh, when soil fertility and seed viability have not been reduced by stockpiling. If topsoil is to be stockpiled, it will only be done above the excavation site to avoid mixing it with excavated sub-soil. Topsoil will only be re-spread on batters with a grade of 1:1 (V: H) or flatter. Top soil spread on steeper batters will not stay on the place.

iii. Minimize Land Use Change

Due to the construction of the proposed road, there will be change in land use mainly by the conversion of cultivated land and forest into the road permanently, and the degradation of road adjacent to the road corridors by disposing spoils and quarrying of materials. The changes in land use will have impact on loss of forest land. The land use on the formation width of the road has to be converted immediately, however, the land use, particularly forest

can be kept as forest by minimizing removal of vegetation. The authority will consistently monitor to avoid encroachment of ROW for illegal settlers on a long run.

iv. Road Safety

As the roads are rural road with very less traffic movement, we do not foresee traffic hazard or accident during the construction period. However, the alignment is used by the general public, safety precaution shall be taken to avoid hazard to general public from the road construction activities.

v. Minimize the Impact of Construction Camps

Following mitigation measures will be adopted:

- Labour camps will be established at such sites so that the existing houses/infrastructure can be utilized as far as possible;
- The Contractor will prepare a detailed plan for construction camp including location (distance from settlements, drainage facility, outdoor facilities, and surrounding areas), housing facilities (site roads, drainage, waste management and other facilities) and need to get approval from the RCIP;
- Basic facilities such as potable water supply, clean eating area, lighting, safe access, air supply, LPG /kerosene, and others will be arranged for the workers;
- First aid facilities will be made available at camp sites. In addition to this, collaboration with health/sub-health posts for major injury cases including a contingency plan for emergency cases will be prepared;
- The Contractor will be responsible to control open defecation and pollution of stream sites and public places by providing temporary toilet facilities, such as pit latrine with facility of separate solid waste collection bins for bio-degradable and non-bio-degradable waste etc.

vi. Impact due to Operation of Quarries

It will be the construction contractor's responsibility to verify suitability of all material sources and to obtain the approval of concerned local bodies. Probable site for quarry for stones and aggregates is Sunkoshi River at the distance of 12 km from start of the alignment.

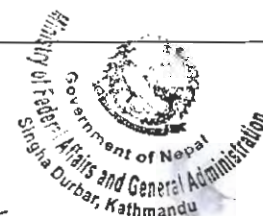
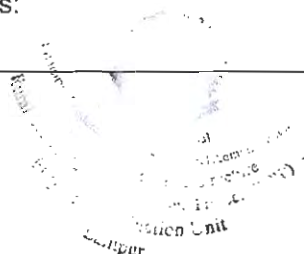
The quarrying will result in

- loss of vegetation and trees;
- Since the quarrying will be carried out in the hilly slope, we can expect possibility of slope failure;
- Quarry operation plan will be prepared and approved by RCIP; Once the quarrying is completed, Reinstatement of Quarry Site will be carried out which shall consist of
 - Stabilization of slope by applying support structures;
 - Drainage to minimize scouring by the water;
 - Vegetation/Bioengineering as far as possible.

vii. Stockpiling of Construction Material and Spoil/ Debris Disposal

Following mitigation measures will be applied.

Stockpiles:



- The land for storing the construction material will be far from the agriculture land and water bodies;
- Stockpiles will be kept wet by sprinkling water or covered so that erosion by wind causing dust will not occur;
- The materials transporting vehicle will be covered by tarpaulins;
- Construction materials shall be placed stockpiled in barren land as far as possible to protect the ground vegetation.

Spoil/debris disposal:

- The Contractor will use such spoils/wastes for construction purposes as far as possible;
- No spoils or waste is allowed to be disposed on the valley side of the road.

viii. Obstruction to Natural Drainage Pattern

The following mitigation measures will be adopted:

- Avoid road-side drain water to be discharged into farmland or environmentally sensitive locations. In order to prevent damages in downstream areas, construct additional drainage channels as needed;
- Do not divert water away from natural water-course unless it is absolutely necessary. In such cases, provisions must be included to allow by-pass for migrating fish;
- Avoid any blockage or diversion of natural channels due to (intended or incidental) disposal of spoil;
- Air, Noise, vibration and Water Pollution.

ix. Noise Pollution

The following mitigation measures will be adopted to minimize the noise pollution:

- Prohibition of using pressure horn by vehicles and equipment near the settlement and wildlife habitat areas;
- Provision of wearing ear muffs during working in noisy areas.

x. Air Pollution

The mitigation measures to be adopted by the Proponent will include following:

Prohibition of open storage and spillage of loose soil in and around construction site

- Covering of the stockpiled spoil with an erosion control material;
- Covering of truckloads of material during transportation;
- Sprinkling of water on working areas and road if dust pollution becomes nuisance;
- Use of good quality of fuel.

xi. Water Pollution

The following mitigation measures will be adopted in order to minimize the impact on surface water quality:

- Disposal of soil, sludge, and other wastes directly into water bodies will be avoided;
- Prohibition of activities like washings - cloth, dish etc. near water bodies causing water bodies pollution, risking downstream users;



- Prevention of soil slippage at toe of the stockpile areas by installing barriers at the perimeter;
- Prohibition of urination and defecation in open areas and water bodies by construction workers with the installation of sanitation facilities.

8.2.1.3 Post construction Phase

i. Dismantling of Camp Site and Camp Site Restoration

At the completion of construction, all construction camp facilities will be dismantled and removed from the site. The site will be restored to a condition in no way inferior to the condition prior to commencement of the works.

Various activities to be carried out for site restoration are:

- Oil and fuel contaminated soil will be removed and transported and buried in reapproved waste disposal areas;
- Soak pits and septic tanks will be covered and effectively sealed off;
- The contractor will execute all works to restore the site and land cleared of all debris and will hand over to the community/land owner or lesser in clean condition without any encumbrance;
- Campsite is to be restored to its original condition as per the rehabilitation plan;
- Restoration of top soil should be done;
- Disposal of waste generated at camp sites will be done at designated locations.

ii. Clearing of Water Channels, Side Drains and Culverts

The following mitigation measures will be adopted:

- The precincts of the water body have to be left clean and tidy with the completion of construction;
- Temporary structures constructed during construction will be removed before handing over to ensure free flow through the channels;
- Removal of debris and disposal will be done in designated location.

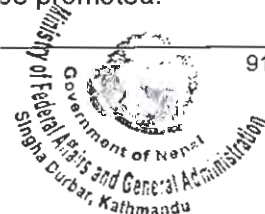
8.2.1.4 Operation Phase

i. Impacts due to Slope Instability

The following mitigation measures will be adopted:

- Correction or maintenance of the slope protection measures and drainage works;
- Minor landslide and mass wasting will be immediately cleared and slope restored with appropriate technology (bio-engineering);
- Rill and gully formations should be regularly monitored and immediately fixed at critical areas;
- Soil conservation will be promoted in the right of way and vulnerable areas beyond the road alignment;
- Promotion/support/assistance to community forestry programs, not only in the right of way, but also beyond in erosion-prone lands;
- Soil amelioration methods in the right of way and beyond should be promoted.

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Ministry of Road and Transport
Lalitpur



ii. Right of Way Encroachment

Mitigation measures depend much on the local government ability for good land use planning and governance to discourage and/or remove such newly upcoming settlements along the road. Mitigation measures include:

- Establish public notes that specify the acquisition/property rights of the RoW, and that explain at the same time non-permissive uses of the RoW by non-entitled persons;
- Establish and propagate an effective land-use plan for the region; such land-use plan should clearly incorporate future visions for acquiring land for further road net expansion;
- Prepare good cadastral records that can easily be verified by land-use planners;
- Good demarcation of RoW, incorporating physical barriers and appropriate planting (through community forestry programs) of selected zones adjacent to the road;
- Incorporate physical barriers in zones of potential or prospected encroachment risks, e.g., by roadside plantation schemes;
- Initiate, by engaging local NGOs/CBOs, community awareness and assistance programs to prevent undesired land-take and roadside squatter development;
- Provision of appropriate mechanisms for grievance resolution to settle disputes between new squatters and local communities;
- Exert all legal and socially acceptable means to evict illegal occupants of the Row, but take in due consideration the needs and constraints of vulnerable and indigenous groups;
- Consider long-term solutions to avert undesired growth (e.g., expanding markets along road or in different axis) by planning for road bypasses in congested areas;
- The DCC, RMs should make local communities aware of the importance of the RoW.

iii. Drainage and Water Management

Adequate lined drain and cross-drainage structures should be constructed as per the design.

The following mitigation measures will be adopted:

- Maintenance of smooth discharge across culverts and cross drainages by cleaning and maintaining them regularly so that water logging on adjacent land due to road do not occur;
- Roadside drain water will not be discharged into farmland or environmentally sensitive locations;
- Regular cleaning of roadside channels to avoid any blockage of drainage;
- Regular maintenance for water management structures and preserving vegetative embanked slopes will be applied during maintenance and operation of the road.

iv. Air and Noise Pollution

Following mitigation measures will be adopted to mitigate air pollution:

- Roadside plantation especially nearby settlements and other public places will help to reduce pollution due to dust;

- RCIP will coordinate with relevant agencies on the implementation and enforce Nepal Vehicle Mass Emission Standard (NVMES) 2069 and will stipulate vehicle owners to engage in proper and regular vehicle maintenance;
- Air pollution by dust will be controlled with provision of paved shoulders, especially in the sensitive/built up areas.

Following mitigation measures will be adopted to mitigate noise pollution:

- Effective traffic management and good riding conditions will be maintained to reduce the noise level throughout the stretch and speed limitation and honking restrictions will be enforced near sensitive locations such as health post, schools etc.

8.2.2 Biological Environment

8.2.2.1 Pre-construction Phase Activities

- i. Diversion of Forest Land
 - Compliance with Forest Act;
 - Activity scheduling to avoid delays, confirmation to legal requirement.
- ii. Loss of Forest and Vegetation
 - Compliance with Forest Act in case trees are on forest land;
 - Prior clearance from Department of Forest and Soil Conservation; coordinate with division forest officer.

8.2.2.2 Construction Phase

- i. Clearing of Forest Land and Trees, Shrubs and Herbs and Habitat Disturbance

The loss of trees cannot be minimized; however, it can be compensated by the plantation. According to the "Work Procedure with Standards for the Use of National Forest Land for National Priority Project, 2076", Section 17 (8), project has to carry out plantation (with protection for five years) equivalent to the 10 times the number of lost tree and compensate the loss of forest area from the construction of the road by providing the equivalent land (Section 8(1) or pay for the plantation and protection cost to the Forest Development Fund (Section 8(3), Section 13). For the plantation and protection for five years of 4510 trees, total cost is estimated at NRs 2,761,275 and for compensation of lost forest area, NRs 4,315,500.00 has been estimated. Road side plantation (income generating plant) will be done to add greenery in the subproject area wherever space is available.

Similarly, for the afforestation in the compensated land at the rate 1600 sapling per hector and protection for 5 years, NRs 3,029,133 has been estimated and will be provided to Division Forest Office. (As per the review of Cabinet Decision on use of forest land for RCIP Roads in Ongoing Projects 2077/78 BS)

Use of forest product by construction workers and construction activities

- The project management should instruct the project officials, labour force, contractors, consultants and other stakeholder not to indulge in such activities and abide by the forest act and its regulation;

- The Contractor documents will include provisions to restrict work forces with regard to forest product and wildlife collection and trade;
- The Contractor will prevent illegal cutting of forest wood by labour force. He is also liable for penalties to violators;
- Equally, collection of non-timber forest products (e.g., bamboo, medicinal plants, mushrooms) by work staff will be prohibited and enforced;
- The contract documents will include provisions to instruct contractor arrange alternate energy such as kerosene, LPG for labour by making provision in contract document.

ii. Disturbance of Biodiversity and Wildlife

- Efforts will be made to avoid disturbance to these animals to the extent possible;
- Every precaution will be taken to minimize noise and other human activities during construction within the corridor;
- Construction activities will be carried out during day time to prevent disturbance to wildlife;
- The subproject should closely coordinate with Forest Office, CFUGs and its outlets to control illegal poaching and trapping by the subproject stakeholders or other outside wildlife poachers, wildlife traders and timber smugglers;
- The proposed cross drainage structures will be constructed as per design and wildlife friendly with adequate clearance underneath for easy passing and wide vision for wild animals taking due guidelines outlined in Directives on Wildlife Friendly Infrastructure Development, 2078.

8.2.2.3 Operation Phase

i. Impacts on Forest Resources

The mitigation measures recommended are:

- Encourage and support local communities and authorities in controlling illegal harvesting of forest resources;
- CFUGs will be supported to conserve and manage their CFs according to operational plans;
- Encourage and support local community for controlling illegal harvesting of forest resources.

ii. Wildlife Disturbance

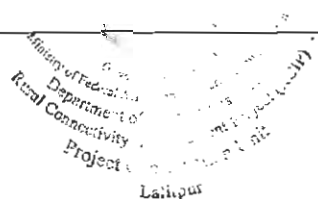
The following mitigation measures will be adopted:

- Coordination with DFO and CFUGs to control the activities like illegal hunting and poaching of wild fauna, especially listed in CITES and IUCN red data book by enforcing acts and regulations strictly.

8.2.3 Socio-economic and Cultural Environment

8.2.3.1 Construction Phase

i. Land and Property Acquisition



The following mitigation measures will be adopted:

- Clear demarcation of proposed road will be placed on the ground;
- Affected land will be identified through cadastral survey and ownership of the affected parcel will be verified from land revenue office;
- The land owner will be consulted and assessed before road construction. The subproject will apply the following criteria while planning and designing the Subproject roads;
- In case where in the impacts are unavoidable, the losses will be minimized through the adoption of one or more of the following mechanisms.
 - Design modifications by reduction of land width, alignment shifts, and modifications in cross-section etc. for little or no loss of land and structures;
 - Voluntary donation of land/ assets by the land/ asset owner by means of MoU to executing agency;
 - Providing support and assistance to the vulnerable affected persons as per CPP report;
 - With regards to donation of land, affected persons have the choice of opting for donating or refusing to donate their land/ assets.
- Three months prior notice will be provided at the subproject site to harvest standing crops;
- Deed of transfer fees will be provided to be the affected household;
- Transportation cost will be provided to affected land owners;
- Income generation and livelihood improvement program will be organized for affected dalit, janajati, women headed household;

In case voluntary donation of such structures are not possible, cash assistance as per replacement cost will be provided to meet loss of such structures, or provisions of materials and /or labor.

ii. Pressure on Public Utilities and Facilities

Impact on existing social service facilities can be mitigated by:

- Relocation, reconstruction will be done for the affected public utilities (3 water tank and 112 electric poles);
- Improving the existing local services and facilities;
- Provide required facilities in the camp during the subproject construction; and
- Use of local people in construction activities to reduce the extra burden on existing resources.

iii. Occupational Health and Safety, STDs and Nuisance from construction camps

- Make mandatory the use of helmets, safety belts, masks, gloves and boot by workers depending on nature of work;
- Necessary planning and safety approach will be made for rescue during emergency;
- The supervisor will have to check whether the provisions made in the plan are implemented according to plan;
- Workers will be provided with first aid and health facilities;
- There will be provision for group accidental insurance for the workers;
- First aid training will be provided to field staffs like overseer, social mobilizers and supervisors;



- Strict rule for non-complying safety condition such as payment withholding and/or termination of contract;
- Respective provisions will be included in the contract document with contractor.

iv. Pressure on Social Service Facilities

Impact on existing social service facilities can be mitigated by:

- Improving the existing local services and facilities;
- Provide required facilities in the camp during the subproject construction; and
- Use of local people in construction activities to reduce the extra burden on existing resources.

v. Social Conflicts due to Influx of Construction Workers

- Information signboards will be placed at required places and safety measures installed as precautionary measures;
- Strict rules and regulation will be maintained in the labour and work camp so that any engagement in alcoholic and other bad habits are restricted.

8.2.3.2 Operation Phase

i. Possible Township Development and Likely Environmental Impacts along the Road Alignment

The mitigation measures are:

- Plantation of trees in the RoW so that it is not encroached;
- Awareness raising programme through local organizations about importance of RoW;
- Local government bodies shall regulate settlement growth with proper planning.

ii. Roadside Safety Issues

In order to mitigate such incidents following safety measures and restriction on speed will be adopted.

- Required delineators, safety signs, road bumps etc. will be used as appropriate along the road;
- Road safety awareness programs will be conducted, including the propagation of educative material in local language(s);
- The material will be propagated in schools and be available at Rural Municipality;
- It is also recommended to place illustrated sign boards at accident-prone spots and bus bays;
- Footpaths should be placed at the town limits and settlement areas.

iii. Social Conflicts

Following Measures should be adopted:

- Awareness program for importance of RoW;
- Enforcement of law;
- Planning of land development; and
- Plantation of road side trees.

Ministry of Federal, DDP, and Rural Communities
Project



8.2.4 Chemical Environment

8.2.4.1 Construction Phase

i. Use of Fuel, Lubricants, Oil, Acids and Other Chemicals for Construction

- Chemicals such as oils, chemicals, paints, acids etc. will be stored in leak proof container and disposed in pit safely after use;
- The vehicles will not be washed directly into the water bodies. The vehicles and equipment will be maintained from time to time to ensure any leakage from them.

ii. Use and Storage of Chemicals like Bitumen, etc.

Following mitigation measures will be adopted:

- Avoid heating of bitumen near water sources and disposal of bitumen in water bodies,
- Secure safe site for bitumen storage,
- The permission from the land owner will be obtained before commencing the storage activities.
- The bitumen storage will not be done on fertile land and nearby water bodies.
- If bitumen has spread over the land accidentally and in improper place then it will be cleared immediately.
- The bitumen will not be discharged into the drain structure while overlaying on the subbase material.
- Bitumen related work will not be carried out during the rainy condition.

8.2.4.2 Operation Phase

i. Effect on Water Quality

For control of water quality, the Rural Municipality along the roadside will control haphazard cleaning of vehicles and the leakage of fuels and lubricants into water channels. The effects of chemicals resulting from vehicle leakage can be minimized by preventing their draining into the adjacent water courses. The washing of cars in rivers and water bodies should be strictly controlled (by traffic police and/or CBOs) and violators be penalized. In places where car washing habits have evolved, it is advised to erect signboards (illustrated and in local language) that explain the inherent risks for people utilizing the source for drinking and aquatic life, and also indicate penalties for violators.

ii. Use of Fuel, Lubricants, Oil, Acids and Other Chemicals for Construction and their Storage

Chemicals such as oils, chemicals, paints, acids etc will be stored in leak proof container and disposed in pit safely after use. The vehicles will not be washed directly into the water bodies. The vehicles and equipment will be maintained from time to time to ensure any leakage from them.

8.3 Issues Raised by Public

Apart from the above-mentioned impacts/issues, following issues were encountered during the study period and has been included in the report:

- Minimum loss of forest area and resources
- Provide adequate compensation for private and public properties losses

8.4 Measure Adopted in Response to Issues Raised by Public:

During the road upgradation work, there are possibilities of affecting an earthen irrigation canal crossing at 1+870. Hume pipe should be extended to end of the road and affecting irrigation canal will be managed as per requirement.

Loss of forest is inevitable while construction of road. However, a provision is made to compensate the loss of trees by plantation in another area. Road side will be planted with income generating trees wherever possible. Cost has been allocated for the Plantation of tree sapling 10 times of the loss of tree and protection for 5 years.

Cutting area and unstable area will be mitigated by bioengineering measures. Shrubs like Amliso will be given priority for the plantation.

Ministry of Forests and Environment
Department of Forest Management and Conservation
Rural Development Division
Project Coordination Unit
Lamjung



Ministry of Federal Affairs and General Administration
Government of Nepal
Singha Durbar, Kathmandu

9 ENVIRONMENTAL MANAGEMENT PLAN

The Environmental Management Plan (EMP) identifies key issues likely to arise from project implementation, and proposes mitigation measures, including monitoring schedule and responsibility. Taking into account these considerations, the it guides the project management in such a way that the environmental protection measures are adequately implemented.

Environmental Management Action Plan has been incorporated into this IEE report as its key safeguarding tool against adverse impacts. EMAP amongst others also entails to augment:

- Better road surface conditions upon completion of upgrading works;
- Improved and reliable road serviceability for the locals;
- Better social services - higher education, health services *etc.*;
- Skill development opportunities for the locals and labours;
- Improved marketing outlets to rural agricultural productions.

9.1 Institutions and Their Roles

Responsibility for environmental management associated with the proposed road upgrading involves a number of parties involved with road construction, each with specific responsibilities. Main parties responsible for the implementation of environmental safeguards measures prior to -, during - and following - proposed road upgrading is presented below:

- Ministry of Federal Affairs and General Administration (MoFAGA) has the main responsibility to execute environmental safeguards;
- Department of Local Infrastructure (DoLI) including Rural Connectivity Improvement Project (RCIP) – is the main proponent of this subproject thus has responsibility of implementing of this proposed road upgrading including implementation of this IEE report;
- AVIYAAN-SOILTEST-CARD JV, the consultant, has the responsibility of preparing the final detail design of the proposed road upgrading including incorporation of EMAP into the final design. In times, the consultant will also have to update the EMAP by addressing changes and/or incorporating details information that may be available of the environmental and social components at the time of subproject implementation;
- Supervision Consultant will have to oversee entire activities of the subproject including day to day supervision of the construction including full compliance of the EMAP;
- Construction Contractor will be responsible for undertaking all road works assigned to him in accordance with contract document, including specified conditions in the EMAP. The contractor will work closely with the supervision consultant in order to ensure that proposed road upgrading works are undertaken according to EMAP specified standards.

Specific responsibility of RCIP, AVIYAAN-SOILTEST-CARD JV (The Consultant), Supervision Consultant and Contactor are as outlined below:

9.1.1 RCIP

- Acquisition of all necessary private assets - land and physical structures - according to design/construction needs;
- Review and approval of surveyed road alignment;
- Review and approval of detailed design of proposed road upgrading;
- Securing necessary permits from other line agencies of GoN including local institutions related to proposed road upgrading activities (Division Forest Office, District Administration Office, District Land Survey Office, District Land Revenue Office, District Coordination Committees, Rural Municipality);
- Review and approval of proposed ancillary activities (workforce camps, quarry, etc.); and
- Road maintenance, environmental monitoring and management following road handed over by the contractor.

9.1.2 AVIYAAN-SOILTEST-CARD JV (The Consultant)

- Prepare final design for the proposed road upgrading by also integrating EMAP into the design;
- Survey and pegging of proposed road upgrading work according to design;

9.1.3 Supervision Consultant

- Supervise construction undertaken by the contractor according to contract document;
- Inspect and report contractor's state of works related to EMAP respect;
- Issue corrective action against works requiring its corrections and verify if it has been respected;
- Report all EMAP non-conformances to DoR for action; and
- Certify road works if and when contractor fully respected to EMAP and approved environmental management action plan.

9.1.4 Contractor

- Undertake construction of road works according to approved design, with full respect to EMAP;
- Be available on site as and when inspection of work is to be undertaken by the supervision consultant; and
- Respect supervision consultant's instruction for correction action affected against defective works.

9.2 Matters to be Monitored While Implementing the Proposal

Environmental monitoring involves the systematic collection of environmental baseline data or parameter to determine the actual environment effects of the subproject, compliance of the subproject with regulatory standards, and the degree of implementation and effectiveness of the environmental protection. Monitoring will form part of an Initial Environmental Examination as it generates useful information and improves the quality of



implementation of mitigation measures.

Environmental Monitoring Plan will help to provide timely warning of the potential environmental damages and also to check the implementation of mitigation measures to see whether it confirms to the approved plan.

The plan will be prepared with respect to the environmental parameters, monitoring indicators, and monitoring methods, location of monitoring, schedule of monitoring and responsible agencies or person for monitoring. The monitoring plan will also include the estimated cost for monitoring.

9.2.1 Types of Environmental Monitoring and Indicators

The monitoring plan will be prepared covering Compliance Monitoring and Impact Monitoring.

Baseline Monitoring: It aims to collect and verify the additional environmental baseline data, which is scientific or sociological in nature and needed to augment information on baseline conditions initially generated. General indicators include existing baseline environmental condition like air quality, water quality, noise level, vegetation status, socio-economic conditions emerged.

Compliance Monitoring: It is essential in order to encourage and promote the proponent to comply with the requirement as listed in the mitigation measures and any condition set-forth during the subproject approval. General indicators include compliances with dust reduction strategies, waste management practices, provisions on occupational health and safety, adoption of bioengineering practices, compensatory plantation, process on land acquisition, compensation to damaged structures etc.

Impact Monitoring: Its purpose is to know the actual level of impact in the field during the construction and operation of the proposed Subproject. General indicators include impact on air quality, impact on water resources, increase in noise level, impact in adjoining forest, impact in adjoining settlement areas and agricultural land etc.

9.3 Site Supervision, Monitoring and Reporting

Strict supervision of construction activities needs to be in place prior to and during proposed road upgrading in order to ensure that upgrading works are carried out in accordance with the approved designs and environmental adverse impacts are fully safeguarded according to MAP specifications. A standard system of site inspection will be undertaken over the period of proposed road upgrading including approval and reporting as and if required.

9.3.1 Pre-construction Phase

Pre-construction inspections of each section of the alignment and all ancillary sites will be undertaken by the supervision consultant and Contractor. It will serve to:

- Identify site-specific road construction or environmental problems;
- Identify existing services that are required to be reinstated;
- Identify construction waste disposal sites;
- Identify quarries site for the extraction of construction materials;
- Identify labour and workforce campsites;
- Plan of the phasing of construction along the alignment.

Supervision consultant and Contractor shall discuss and agree upon the factors listed above and document accordingly. The supervision consultant shall review the sites pegged by the Contractor and approve them for construction where appropriate, or request the Contractor to re-peg sites. The cost for inspection is included in the implementation cost.

9.3.2 Construction Phase:

The supervision consultant will undertake daily, weekly, and monthly supervision and inspections of upgrading works depending on its nature during the period of construction and weekly inspection of related activities including campsites during its usage. For any non-respect to EMAP specifications during his supervision and inspection, supervision consultant will issue letter instructing him to correct defective works within specified time, and will document and present it in Monthly Progress Report.

If any activities are not undertaken in accordance with the contract or EMAP specifications, the supervision consultant will document defective works and suggest corrective measures in the Weekly Report. The supervision consultant will provide a copy of the fortnight report to the Contractor within 2 days of the Inspection for action.

Monthly Inspections -the supervision consultant will undertake a monthly inspection of all sites in use over the preceding month, as well as site activities currently in progress, at the end of each month together with the Contractor.

If any activities are not undertaken in accordance with the contract or EMAP conditions, the supervision consultant will document defective works and suggest corrective measures in the Monthly Report. The supervision consultant will provide a copy of the Monthly Report to the Contractor within 2 days of the Inspection for action.

9.3.3 Post-Construction Phase

The supervision consultant shall undertake a post-construction certification inspection of each completed section of road and each rehabilitated ancillary sites. Certification will be based upon the contract conditions and EMP conditions.

9.3.4 Operation Phase

Environmental monitoring of upgraded road during the operation phase will concentrate on the impact of key environmental issues identified during subproject design including slide and its conditions, drainage, road side structures etc.

RCIP also will undertake at most two inspections in a year. These inspections will include a visual assessment of:

- Road surface condition;
- Slope conditions (cut/ fill);
- Road side structures;
- Drains and drain line including its state;
- Damage from excess materials disposal.

9.4 Project Level Monitoring

According to type of work activities, supervision consultant will, on behalf of Project, undertake its level-of monitoring of road upgrading leading to sealed bituminous surface.

This monitoring will strictly stick to practicing the approved environmental management plan as well as use monitoring indicators/parameters specified in it. This will form 'yard stick' as, if and where concerned contractor has shown his sincerity by effecting into action management prescriptions.

9.5 RCIP Level Monitoring

RCIP will undertake bi-annual monitoring of upgrading works with specific focus on issues associated with road upgrading, level of contractor's respect to EMAP, site constraints etc.

9.6 Organization of Environmental Management

Figure 9.1 outlines a number of government agencies responsible for environmental management and its monitoring in line with EPR, 1997, Rule13 (Amendment). RCIP, under the Ministry of Federal Affairs and General Administration (MoFAGA) is the proponent of the proposed subproject.

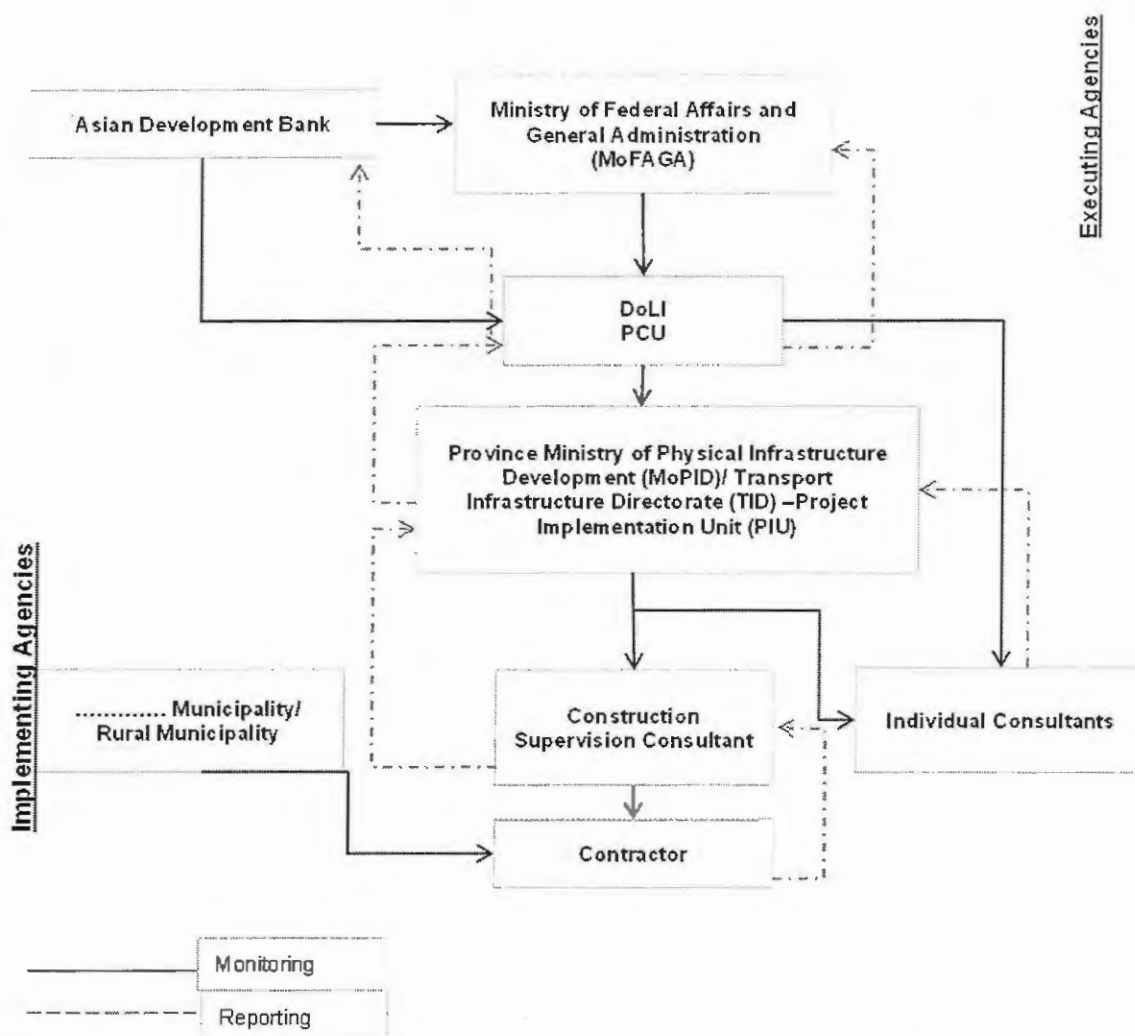


Figure 9-1: Environment Management, Monitoring and Reporting Organizational Structure

Note:

DoLI: Department of Local Infrastructure

PCU: Project Coordination Unit

Table 9-1: Institutions and their Roles in Implementing EMP

| Institution | Role | Responsibility in The Project |
|--|---|--|
| Ministry of Federal Affairs and General Administration (MoFAGA) | Concerned Ministry and the Executing Agency of the Project. It Provides backup support to Local Government and DoLI in Policy and Execution. It has an Environment and Disaster Management Section. | To review and approve ToR of IEE and IEE Report of Lubughat-Galpa-Doramba Road, Ramechhap District, undertake environmental monitoring as central agency |
| Department of Local Infrastructure Development (DoLI) | Department under MoFAGA. It has a section with an environment responsibility. Coordination with Province and Local Governments for executing infrastructure Development Works | Executing Agency of RCIP. Responsible to execute infrastructure projects under MoFAGA. Provides backup support to Local Government. Undertake Environment Assessment and submit to MoFAGA for Approval |
| RCIP-PCU | Project Coordination Unit (PCU) | Overall oversight, monitoring, coordination of project safeguard aspects; Manage the interface between the ADB and the GoN; Support PIUs on policy development and harmonize guidelines and standards on environmental and social safeguards |
| Province Ministry of Physical Infrastructure Development (MoPID) | Concerned Ministry at Province Level | Coordination and Provides backup support to Local Government and TID |
| Transport Infrastructure Directorate (TID) | Technical wing of MoPID | Provide Technical Support for Project Implementation, Coordination and Support to PIU |
| RCIP-PIUs | Project Implementation Unit (PIU) under TID-MoPID | Planning, prioritization, selection, design, procurement and implementation of all safeguards related works and reporting; Day-to day quality control, monitoring; to support in ensuring effective coordination. |
| Local Government (Sunapati RM, Khandadevi RM and Doramba Sailing RM) | Monitoring and evaluation during construction stage | Monitoring and reporting the environmental safeguards |

Ministry of Federal Affairs and General Administration
Department of Local Infrastructure Development
Project Coordination Unit
Lalitpur



Ministry of Federal Affairs and General Administration
Singha Durbar, Kathmandu

Initial Environmental Examination (IEE) of Lubughat-Galpa-Doramba Road, Ramechhap District

| Institution | Role | Responsibility in The Project |
|---|---------------------------------------|---|
| Construction Supervision Consultant (CSC) | Supervision of the Construction works | Supervise contractor on execution of safeguard works and report progress of the same to RCIP (PCU/PIUs) |
| Contractor | Project road construction | Responsible for overall activities related to the construction of road, Implementation of EMP |

Table 9-2: Compliance Monitoring for Lubughat -Galpa - Doramba Road

| S N | Parameters/Issues | Responsible Implementing Agency | Verifiable Indicators | Verification Methods | Schedule | Responsible Monitoring Agency |
|--|--|---|--|---|---|-------------------------------|
| Socio-economic Environment (Construction phase) | | | | | | |
| 1 | Employment opportunity for locals in road construction | Contractor | Number of laborers from road affected rural municipality employed as skilled/ unskilled Labour in the road construction. | Employment records / observation of labor camp and work stations | Periodically during construction phase | Supervision consultant/R CIP |
| | | | Percent/ number of socially and economically vulnerable people (Janajati, Dalit, Women etc.) | Employment records / observation of labor camp and work stations | Periodically during construction phase | Supervision consultant/R CIP |
| 2 | Income generation training | PCU in coordination with district level government agencies | Number of vulnerable populations amongst severely affected HHs | Verification of the records of the selected households for the training / focus group discussion with the severely affected families. | After selection of the training | RCIP |
| | | | Number of trainings and participants | Verification of the records of the selected households for the training / focus group discussion with the severely affected families. | After completion of the training | RCIP |
| 3 | Upgrading of the skill in road construction | Supervision consultant/ Contractors | Number of trainings organized on (a) road construction, (b) soft engineering structures and (c) bio-engineering works | Training records, check training project reports, assess feedback form participants. | Beginning of construction and during construction | RCIP |
| | | Supervision consultant/ Contractors | Number of participants in the training program from project affected area | Training records, check training project reports, assess feedback form participants. | After completion of the training | RCIP |
| | | Contractor | Number of trained graduates from project affected area working as a skilled laborer | Employment records of the contractor/ feedback from employed local laborers as skilled laborers. | After completion of the training | RCIP |

Initial Environmental Examination (IEE) of Lubughat-Galpa-Doramba Road, Ramechhap District

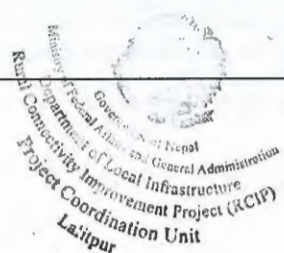
| S N | Parameters/Issues | Responsible Implementing Agency | Verifiable Indicators | Verification Methods | Schedule | Responsible Monitoring Agency |
|--------|--|--|---|---|---|-------------------------------------|
| 4 | Support local to run local enterprises and commercialization | Supervision consultant | Number of food and tea shops running by the locals to serve the work force. | Field verification of the services of the tea and food shops/ FGD with the laborers/ FGD with local entrepreneurs | Periodically during construction phase | RCIP |
| 5 | Compensation to loss of residential/ commercial structures | Supervision consultant | Price fixation for loss structure by CDC/ Compensation amount/ acquired land and properties from the HH | Records of CDC and FGD with families which have lost properties and land | After settlement of the prices by CDC | RCIP |
| | | | Transport allowance provided to the affected families | Records of CDC and FGD with families which have lost properties and land | After settlement of the prices by CDC | RCIP |
| 6 | Occupational health and safety measures for the laborers | Contractor | Mandatory use of safety features during construction by the laborers | Observation of working sites | Periodically during construction phase | RCIP/Supervision Consultant |
| | | | Availability first aid material at the site for primary treatment | Observation of working sites and camps | Periodically during construction phase | RCIP |
| | | | Medical facility in the camps | Observation of labor camps | Periodically during construction phase | Supervision consultant |
| | | | Cases of withholding of payment to the contractor for non-compliance on occupational health and safety | Records of Supervision consultant reports | Annual reporting of Supervision consultant | MoFAGA |
| 7 | Control in use of alcohol, prostitution, etc. by laborer coming in from outside subproject area to prevent social conflict | Contractor | Case of conflict between laborers and locals | Police records/ FGD with locals and laborers | Periodically during construction phase | Supervision consultant |
| | | Contractor | Application and compliance of rules to prevent anti-social activities in the camps | Contractor records on rules of behaviors of laborers/ incidence of punishment for violation of rules | Beginning of construction and during construction | Supervision consultant |
| 8 | Prevent encroachment of ROW by ribbon development along the alignment | Contractor/ Supervision consultant / DOF | Number of trees planted in the ROW, and number of saved trees from removal in ROW | Observation of site | Annual monitoring during construction phase | RCIP/ MoFE |
| | | | Number and location of illegal settlement along the alignment | Observation of alignment | Annual monitoring during construction phase and operational phase | RCIP/ Municipality/ Ward |
| 9 | Application of road safety measure | Supervision consultant/ Contractor | Number of road safety signs in accident prone segments of the alignment | Observation of the alignment | after completion of the construction | RCIP |

Initial Environmental Examination (IEE) of Lubughat-Galpa-Doramba Road, Ramechhap District

| S N | Parameters/Issues | Responsible Implementing Agency | Verifiable Indicators | Verification Methods | Schedule | Responsible Monitoring Agency |
|----------------------|---|---------------------------------------|--|---|---------------------------------------|-------------------------------------|
| Physical Environment | | | | | | |
| 5 | Relocation and restoration of the public utilities | Contractor | Relocated and restored utilities | Walk through survey | Periodic observation of the alignment | Supervision consultant/R CIP |
| | Slope protection | Contractor | Application of slope protection civil structures | Walk through survey | Periodic observation of the alignment | Supervision consultant/R CIP |
| | | Contractor | application of bio-engineering method used at recommended sites | Walk through survey | Periodic observation of the alignment | Supervision consultant/R CIP |
| | | Contractor | Construction of road side drainage to avoid slope cutting by the rainwater | walk through survey | Periodic observation of the alignment | Supervision consultant/R CIP |
| | | Contractor | Disposal of spoil down the hill at slope cut site along the alignment | Walk through survey | Periodic observation of the alignment | Supervision consultant/R CIP |
| | | Contractor | Disposal of spoil in the designate site for spoil disposal | Walk through survey | Periodic observation of the alignment | Supervision consultant/R CIP |
| 7 | Extraction of material from recommended quarry sites | Contractor | No cases of material extraction reported from unauthorized sites | Walk through survey, interaction with local peoples | During construction phase | Supervision consultant/R CIP |
| | | Contractor | Restoration of the quarry sites - maintenance of slope gradient, application of drainage to avoid slope failure, plantation of the site. | Observation of quarry sites | After completion of the construction | Supervision consultant/R CIP |
| 8 | Control of dust pollution | Contractor/ Supervision consultant | Dust level at construction site, water sprinkling practice observed | Observation of alignment | During construction phase | RCIP |
| 9 | Spoil dumped in safe tipping sites | Contractor/ Supervision consultant | Spoil dumped in sites recommended | Interaction with project manager and local people, walkthrough survey along road alignment, photographs | During construction phase | RCIP |
| 10 | Erosion protection measures used in material stockpiling area | Contractor | Erosion protection measures used (Bio-engineering works), bunds constructed adequate drainage provided | Visit to material stockpiling area, observation, photographs | During construction phase | Supervision consultant/ RCIP |
| 11 | Road safety | Contractor | Used of sign boards (speed limit, men at work, danger etc.) during upgrading safety passage provided to vehicles | Walkthrough survey observation, photographs, interaction with locals | During construction phase | Supervision consultant/R CIP |

Initial Environmental Examination (IEE) of Lubughat-Galpa-Doramba Road, Ramechhap District

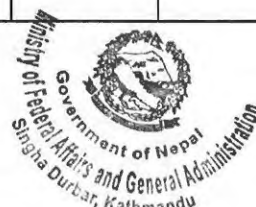
| S N | Parameters/Issues | Responsible Implementing Agency | Verifiable Indicators | Verification Methods | Schedule | Responsible Monitoring Agency |
|-------------------------------|--|--|---|--|---|-------------------------------------|
| 12 | Measures to protect environment from air and noise pollution | Contractor/ Supervision consultant | Dust level (PM2.5, PM10), CO2 and noise level at work sited, major settlements and sensitive spoils like health centers and schools | Visual observation of good upgrading practices and discussion with residents and workers | Once in a month during construction | RCIP |
| Biological Environment | | | | | | |
| 13 | Spoil disposal in forest and water bodies | Contractor | Soil disposal in forest and sensitive areas | Walkthrough survey observation, photographs | During construction period | Supervision consultant/R CIP |
| 14 | Compensatory plantation done | Contractor | Total seedlings to be planted is quantified and budget has been allocated for compensation. | Visit to re-plantation area | Before issuing of construction completion certificate | |
| 15 | Prevent usage of firewood | Contractor | Use of firewood by labor and bitumen heating | Inspection interaction with local community forestry and labors | During construction phase | Supervision consultant/R CIP |
| | | | Availability of kerosene, LPG gas, petroleum products according to the estimate | Observation of the construction sites and camp/ verification of the records | Periodic observation of the alignment | Supervision consultant/R CIP |
| 16 | Prevent illegal killing, poaching of wildlife | Contractor | Cases of disturbances, illegal and hunting and poaching | Inspection and interview with local people | Once in a month during construction | Supervision consultant/R CIP |
| | | | Application of rules to prevent illegal hunting and poaching by laborers | review of the records, rules, and FCG with the locals and DFO | Periodic observation of the alignment | Supervision consultant/R CIP |
| 17 | Measures to avoid pressure on forest and wildlife | Contractor | Availability of fossil fuel for camps and construction sites | Observation of the construction site and camps/ Inspection and interview with local people | Periodic observation of the alignment | Supervision consultant/R CIP |
| Chemical Environment | | | | | | |
| 18 | Measure to protect water bodies from pollution | Contractor | Visual observation of open defecation and waste disposal around water sources near construction sites, parameters like pH, hardness, DO, etc. | Site inspection test of site selected samples of water at laboratory | Once in six months during construction | Supervision consultant/R CIP |



Initial Environmental Examination (IEE) of Lubughat-Galpa-Doramba Road, Ramechhap District

Table 9-3: Environmental Management Plan (EMP)

| Environmental Impacts | Environmental Mitigation Measures | Approximate Location | How | When | Implementation | Mitigation Cost (NRs.) | Supervision/Monitoring |
|--|--|-------------------------------|--------------------------|---------------------|---|------------------------|-----------------------------|
| [O] Pre-Construction Stage (Upon issuance of Notice to Proceed) | | | | | | | |
| The Contractor will complete the following activities no later than 30 days upon issuance of Notice to Proceed: 1) Appoint the Contractor's Environmental Focal Person (EFP) 3) EFP will submit for approval of supervision consultant a Site Specific EMP (SSEMP) 4) EFP will request supervision consultant copy of monthly monitoring formats and establish deadlines for submission. 5) EFP will submit for supervision consultant approval an action plan to secure all permits and approvals needed to be secured during construction stage which include but not limited to: i) transport and storage of hazardous materials (e.g., fuel, lubricants, explosives), ii) waste disposal sites, iii) temporary storage location, iv) water use, and v) emission compliance of all vehicles. Arrangements to link with government health programs on hygiene, sanitation, and prevention of communicable diseases will also be included in the action plan, v) Construction camp layout | | | | | | | |
| [A] Benefit Augmentation Measures | | | | | | | |
| Construction Stage | | | | | | | |
| 1. Employment Opportunity and income generation | <ul style="list-style-type: none"> Employ local people if, and where they are available and willing to work Give more emphasis to women, ethnic minority and Dalit | Throughout the road corridor | Observation | During Construction | Contractor | Construction Contract | Supervision consultant/RCIP |
| 2. Skill Enhancement | <ul style="list-style-type: none"> Facilitate opportunities for hands-on skills gain in civil works if, when and where labor force willing to | Throughout the road corridor | Observation | During Construction | Contractor | Construction Contract | Supervision consultant/RCIP |
| Operation Stage | | | | | | | |
| 1. Improved Access facility | <ul style="list-style-type: none"> Proper maintenance of the road | Throughout the road alignment | Observation /Supervision | Operation phase | Contractor during DLP period and Construction period/ IDO office after DLP period | Construction Contract | RCIP |



Initial Environmental Examination (IEE) of Lubughat-Galpa-Doramba Road, Ramechhap District

| Environmental Impacts | Environmental Mitigation Measures | Approximate Location | How | When | Implementation | Mitigation Cost (NRs.) | Supervision/Monitoring |
|--|--|--------------------------|--|------------------------|------------------------------------|--|-----------------------------|
| [B] Adverse Impact Mitigation Measures | | | | | | | |
| Socio-economic environment | | | | | | | |
| Construction Phase | | | | | | | |
| Land and Building Acquisition | <ul style="list-style-type: none"> Initiate all acquisition procedures of buildings and other temporary structures 3 months prior notice will be provided in advance at the project site informing about the project work clearly demarcated on the ground and changes will be made to avoid the land acquisition as far as practicable in coordination with the affected household, community people, concerned stakeholders and local bodies Land will be acquired on voluntary donation basis based on land acquisition act. A separate Community Participation Plan (CPP) report will be prepared to address the activities and procedures for land and property acquisition (if any) A permission will be taken from the land owner prior to use the land for establishment of project facilities. Restoration of land will be done after finishing of the work to its original state Rental payment will be done timely as per the contract document with the land owner | Throughout road corridor | Consultation with Land/Property owners | Pre-Construction Phase | RCIP | CPP | RCIP |
| Issue related to Public Utilities and Facilities | <ul style="list-style-type: none"> Inventory of all services to be removed/reinstated/relocated. Locate and reach agreement with affected landowners and local people / end users regarding services (i.e., irrigation canal, tap, standpipes, drainage ditches and walking trails, electrical poles, temporarily cut and reinstated including cuts and reinstatements. Obtain written permission from affected landowners /local people regarding temporary cessation of services. | Throughout road Corridor | Observation | During Construction | Contractor, Supervision consultant | Construction Contract (NRs 5,055,529 for pole relocation) | Supervision consultant/RCIP |

Ministry of Federal Affairs and General Administration
Department of Local Infrastructure
Rural Connectivity Improvement Project (RCIP)
Project Coordination Unit
Lalitpur



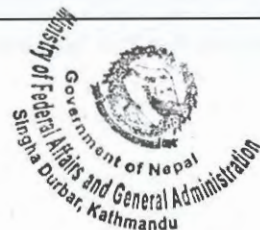
Ministry of Federal Affairs and General Administration
Sungu Gurbar, Kathmandu

Initial Environmental Examination (IEE) of Lubughat-Galpa-Doramba Road, Ramechhap District

| Environmental Impacts | Environmental Mitigation Measures | Approximate Location | How | When | Implementation | Mitigation Cost (NRs.) | Supervision/Monitoring |
|---|---|--------------------------|------------------------------------|---------------------------|------------------------------------|------------------------|-----------------------------|
| | <ul style="list-style-type: none"> Plan with timing to avoid / minimize impact to cultural festivals. Coordinate with concerned authorities | | | | | | |
| Occupational Health and Safety, STDs and Nuisance from Construction Camps | <ul style="list-style-type: none"> Health safety and precaution measures will be managed Safe drinking water, sanitation and toilet facility Provision of first aid kit with required medicines will be managed | Throughout road Corridor | Observation and water quality test | During construction phase | Contractor, Supervision consultant | Construction Contract | Supervision consultant/RCIP |
| Social conflicts due to Influx of construction workers | <ul style="list-style-type: none"> Awareness programme on health and safety, use of PPEs, Good conduct will be carried out Aware the labour not to involve in gambling, alcoholism and prostitutions Be aware about to respect the local, social and cultural norm | Throughout road Corridor | Observation and consultation | During construction phase | Contractor, Supervision consultant | No Cost | Supervision consultant/RCIP |
| Operation Phase | | | | | | | |
| Possible township development and likely environmental impacts along the road alignment | <ul style="list-style-type: none"> Information to local administration regarding the any illegal encroachment along road side Coordination among the administration and other related authorities | Throughout road Corridor | | During Operation | Contractor, Supervision consultant | No Cost | Supervision consultant/RCIP |
| Social Conflicts | <ul style="list-style-type: none"> Coordinate with social health worker to aware the local community about the risk of HIV /AIDS due to unsafe sexual relation | Throughout road Corridor | | During Operation | Contractor, Supervision consultant | No Cost | Supervision consultant/RCIP |
| Roadside safety issues | <ul style="list-style-type: none"> Posting of speed limit and safety sign, Provision of Information boards, traffic signs and signals, road furniture etc. Coordinate with traffic security for time card | Throughout road Corridor | | During Operation | Contractor, Supervision consultant | Construction Contract | Supervision consultant/RCIP |

Initial Environmental Examination (IEE) of Lubughat-Galpa-Doramba Road, Ramechhap District

| Environmental Impacts | Environmental Mitigation Measures | Approximate Location | How | When | Implementation | Mitigation Cost (NRs.) | Supervision/Monitoring |
|--|--|-------------------------------|-------------|------------------------|------------------------------------|----------------------------|------------------------------|
| Cultural (Physical and social)/religious/historical environment | | | | | | | |
| Impact on ancient monuments, historical sites | <ul style="list-style-type: none"> There is no impact on ancient monuments and historical sites | | | | | | |
| Impact on cultural, and religious sites | <ul style="list-style-type: none"> These sites are not likely to be affected | | | | | | |
| Physical Environment | | | | | | | |
| Pre-Construction Phase Issues | | | | | | | |
| Relocation of utilities | <ul style="list-style-type: none"> Precaution and with prior concerned with authority and local people will be taken to relocate the utilities Coordination will be done with local communities for acquisition of lands Precaution will be taken to manage the disposals without disturbing utilities like river, taps, water bodies | Throughout the alignment | Observation | Pre-Construction Phase | Contractor | No Cost | Supervision Consultant/ RCIP |
| Clearance of land | <ul style="list-style-type: none"> There will be the need to identify and use (temporary basis) work sites and area or compound for storage of materials and equipment and that will be cleaned after completion of work The workers will be aware not to make noise They will be aware to keep the waste materials in container They will also aware to maintain the harmony with local people The site will be cleared after the completion of the work | Throughout road Corridor | Observation | Pre-Construction Phase | Contractor, Supervision consultant | Construction Contract Cost | Supervision consultant/RCIP |
| Identification and selection of material sources | <ul style="list-style-type: none"> The procurement of equipment and machineries will be prepared | Quarry Sites (Sunkoshi River) | Observation | Pre-Construction Phase | Contractor, Supervision consultant | No Cost | Supervision consultant/RCIP |



Initial Environmental Examination (IEE) of Lubughat-Galpa-Doramba Road, Ramechhap District

| Environmental Impacts | Environmental Mitigation Measures | Approximate Location | How | When | Implementation | Mitigation Cost (NRs.) | Supervision/Monitoring |
|---|---|---------------------------------------|-------------|------------------------|------------------------------------|----------------------------------|-----------------------------|
| Identification of designated waste disposal locations | <ul style="list-style-type: none"> The spoil generated during road construction will be cleaned The workers will be aware about not to dispose the materials so that it can block natural drainage systems, loss of organic fertile top soil and farmlands, crops and forest, water logging. proper drainage should be designed to avoid erosion and slope failure in the site as well as reduce siltation to the water bodies and cultivated lands | Throughout road Corridor | Observation | Pre-Construction Phase | Contractor, Supervision consultant | No Cost | Supervision consultant/RCIP |
| Stockpiling of Construction Materials | <ul style="list-style-type: none"> Appropriate sites for stockpiling of construction materials shall be selected Stockpile will not be located on/near water courses, schools, hospitals or public standpipes; and will not affect locals and their properties. Obtain written permission from landowners and local bodies for stockpiling on their land. Stockpiles subject to erosion by wind or water will be covered with tarpaulins. For large stockpiles. It will be enclosed with side barriers and also covered when not in use. Clean area properly after completion. | Throughout road Corridor | Observation | Pre-Construction Phase | Contractor, Supervision consultant | No Cost | Supervision consultant/RCIP |
| Construction Phase | | | | | | | |
| Earthworks/Slope Instability | <ul style="list-style-type: none"> Survey and peg the extent of unstable area. Re-vegetation of cut and fill slope or exposed areas as soon as possible by using native plant species Adoption of bio-engineering techniques (shrubs like Amliso will be planted) | Cutting slope along the road corridor | Observation | Construction Phase | Contractor | NRs 2,342,293 for bioengineering | Supervision consultant/RCIP |
| Top soil loss | <ul style="list-style-type: none"> Top soil will be saved by either stockpiling it adjacent to the proposed road formation batter sides, either immediately upslope or down slope of the extent of works, or by stripping it from the road section about to be excavated and re-spreading it immediately onto the previously completed adjacent section of road. | Throughout road corridor | Observation | Construction Phase | Contractor, Supervision consultant | Construction Contract Cost | Supervision consultant/RCIP |

Initial Environmental Examination (IEE) of Lubughat-Galpa-Doramba Road, Ramechhap District

| Environmental Impacts | Environmental Mitigation Measures | Approximate Location | How | When | Implementation | Mitigation Cost (NRs.) | Supervision/Monitoring |
|---|---|--------------------------|-------------|--------------------|------------------------------------|---|-----------------------------|
| | <ul style="list-style-type: none"> The preferred method is topsoil stripping and re-spreading immediately. If topsoil is to be stockpiled, will only be done above the excavation site to avoid mixing it with excavated sub-soil. Topsoil will only be re-spread on batters with a grade of 1: 1 (V: H) or flatter. | | | | | | |
| Change in land use | <ul style="list-style-type: none"> The authority will be coordinated for illegal encroachment along road side The greenery will be maintained along the road side The construction workers will make aware to minimize damage in the forest | Throughout road corridor | Observation | Construction Phase | Contractor, Supervisor, consultant | Construction Contract Cost | Supervision consultant/RCIP |
| Disruption of public utilities | <ul style="list-style-type: none"> The affected utilities will be relocated The precaution will be taken to relocate the utilities If possible alternative management will be done to minimize effect due to relocation of utilities | Throughout road corridor | Observation | Construction Phase | Contractor, Supervisor, consultant | NRs 414,769 for Rehabilitating 3 water tanks. | Supervision consultant/RCIP |
| Traffic hazard and road safety | <ul style="list-style-type: none"> No traffic passing through forest areas | | | | | | |
| Impact due to establishment of construction camps | <ul style="list-style-type: none"> Efforts will be made to establish construction camp at such site so that the existing houses/infrastructure can be utilized as far as possible. The fire precaution, lavatories and showers, potable water supply, clean eating area, lighting, safe access, air supply, LPG /kerosene, and others will be provided. Appropriate facilities for women and children will be provided First aid facilities will be made available at camp sites. Contingency plan for emergency cases will be prepared. | 14+400 and 26+500 | Observation | Construction Phase | Contractor, Supervisor, consultant | Construction Contract Cost | Supervision consultant/RCIP |

Initial Environmental Examination (IEE) of Lubughat-Galpa-Doramba Road, Ramechhap District

| Environmental Impacts | Environmental Mitigation Measures | Approximate Location | How | When | Implementation | Mitigation Cost (NRs.) | Supervision/Monitoring |
|--|--|--------------------------|-------------|--------------------|------------------------------------|----------------------------|-----------------------------|
| | <ul style="list-style-type: none"> Aware the workers, drivers, delivery crew, as well as the communities about health risk of communicable diseases such as HIV virus, STD and AIDS. It will be ensured the sufficient and good quality of food stuff, adequate and safe drinking water Disposal of sanitary wastes and excreta will be into septic tanks. Solid wastes will be reused if recyclable | | | | | | |
| Impact due to operation of quarries | <ul style="list-style-type: none"> Locate and peg quarries and seek approval from the supervision consultant. Obtain permission for extraction of materials from Stakeholders, Municipality, DCC or RM as appropriate. Erosion prone area, dense forest area, settlement, fertile farm land will be avoided for quarrying operation The quarry site will be rehabilitated after completion of the work | Throughout road corridor | Observation | Construction Phase | Contractor/Supervision consultant | Construction Contract Cost | Supervision consultant/RCIP |
| Impact due to stockpiling of construction material and spoil/debris disposal | <ul style="list-style-type: none"> Locate, peg and seek approval from the supervision consultant for the use of stockpile sites. Stockpile will not be located on/near water courses, schools, hospitals or public standpipes; and will not affect locals and their properties. Obtain written permission from landowners and local bodies Cover the stockpiles subject to safe from erosion by wind or water Clean area properly after completion. | Throughout road corridor | Observation | Construction Phase | Contractor/Supervision consultant | Construction Contract Cost | Supervision consultant/RCIP |
| Impact on irrigation channels | <ul style="list-style-type: none"> The precaution will be taken to minimize the damage of irrigation canal The irrigation canal will be maintained after completion of the work Alternative option will be applied to minimize irrigation canal | Throughout road corridor | Observation | Construction Phase | Contractor, Supervision consultant | Construction Contract Cost | Supervision consultant/RCIP |

Initial Environmental Examination (IEE) of Lubughat-Galpa-Doramba Road, Ramechhap District

| Environmental Impacts | Environmental Mitigation Measures | Approximate Location | How | When | Implementation | Mitigation Cost (NRs.) | Supervision/Monitoring |
|---|--|------------------------------|----------------------------------|---------------------|--|----------------------------|-----------------------------|
| Obstruction to natural drainage pattern | <ul style="list-style-type: none"> Suitably drains, cross-drainage structures will be constructed & extended as per detailed design. River training works will be carried out Standpipes and public water supplies will not be used without prior permission of VGP. Public will be consulted regarding location of drainage outfalls. Care will be taken not to disrupt & contaminate water supplies | Throughout road corridor | Observation | Construction Phase | Contractor, Supervision consultant | Construction Contract Cost | Supervision consultant/RCIP |
| Air Pollution | <ul style="list-style-type: none"> Prohibition of open storage and spillage of loose soil Covering of the stockpiled spoil to control erosion Covering of truckloads of material during transportation Sprinkling of water on working areas and road Use of good quality of fuel | Subproject area | Observation and air quality test | During Construction | Contractor Through approved Monitoring agency | NRs 120,000.00 | Supervision consultant/RCIP |
| Noise Pollution | <ul style="list-style-type: none"> Vehicles and equipment used will be fitted with silencer Noise barriers will be placed in sensitive sites i.e., schools, hospitals, college, forest Noise levels (1 hr. Leq dB(A)) will be monitored regularly conforming WHO standards. Construction activities will be carried out only between 6 A.M to 6 P.M | Major settlement areas | Testing Noise level | During Construction | Contractor | NRs 120,000.00 | Supervision consultant/RCIP |
| Vibration | <ul style="list-style-type: none"> Photographic will be maintained for verification of any infrastructure damage during construction | Throughout the road corridor | Observation | During Construction | Contractor | | Supervision consultant/RCIP |

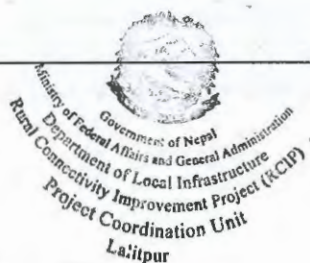


Initial Environmental Examination (IEE) of Lubughat-Galpa-Doramba Road, Ramechhap District



| Environmental Impacts | Environmental Mitigation Measures | Approximate Location | How | When | Implementation | Mitigation Cost (NRs.) | Supervision/Monitoring |
|--|---|-------------------------------|-------------------------------------|---------------------|-----------------------------------|------------------------|-----------------------------|
| Water Pollution | <ul style="list-style-type: none"> Disposal of soil, sludge and other waste directly into water bodies will be avoided Avoid vehicular cleaning activities on/close to the water bodies especially on the river, stream and lakes Prevention of soil slipping at toe of the stockpile areas by installing barrier at the perimeter. Adequate catch drain will be constructed to drain out surface runoff waters quickly as possible | In stream and kholsi | Observation and water quality test. | During Construction | Contractor | NRs 420,000.00 | Supervision consultant/RCIP |
| Post construction phase | | | | | | | |
| Dismantling of camp site and Camp site restoration | <ul style="list-style-type: none"> All temporary structures built for operation of construction and workers camps will be removed Used land will be brought back to original state. The areas will be cleaned | Throughout the road corridor | Observation | After construction | Contractor | Construction contract | Supervision consultant/RCIP |
| Clearing of water channels, side drains and culverts | <ul style="list-style-type: none"> Water channels, side drains and culverts will be cleaned Precaution will be taken to minimize debris and silt in water bodies | Throughout the road corridor | Observation | After construction | Contractor | Construction contract | Supervision consultant/RCIP |
| Rehabilitation of quarry sites | <ul style="list-style-type: none"> The quarry sites will be restored | Quarry Sites | Observation | After construction | Contractor/Supervision consultant | Construction contract | Supervision Consultant/RCIP |
| Operation Phase | | | | | | | |
| Impacts due to slope instability | <ul style="list-style-type: none"> Minor landslide and mass wasting will be immediately cleared and slope restored with appropriate technology (bio-engineering) Soil conservation will be promoted in the right of way and vulnerable area beyond the road alignment. | Throughout the road alignment | Observation | During Operation | Infrastructure Development Office | Maintenance budget | RCIP |

Initial Environmental Examination (IEE) of Lubughat-Galpa-Doramba Road, Ramechhap District

| Environmental Impacts | Environmental Mitigation Measures | Approximate Location | How | When | Implementation | Mitigation Cost (NRs.) | Supervision/Monitoring |
|-------------------------------|---|--------------------------|-----------------------------|------------------------|-----------------------------------|------------------------|-----------------------------|
| Right of Way encroachment | <ul style="list-style-type: none"> Precaution will be taken informing and coordinating government authority about encroachment Encroachment of RoW of Roads will be taken place after completion of construction work. | Throughout road corridor | Observation | During Operation | Infrastructure Development Office | No cost | RCIP |
| Drainage and Water Management | <ul style="list-style-type: none"> Debris or disposing garbage will be kept away from water bodies The precaution will be taken to keep the garbage not to block the drainage If the drainage system got block the workers carefully inform the authority or clean if possible | Throughout road corridor | Observation | During Operation | Infrastructure Development Office | No cost | RCIP |
| Air and Noise Pollution | <ul style="list-style-type: none"> Precaution will be taken to minimize the air, water and noise pollution old vehicles will not be used Horn will be prohibited. | Throughout road corridor | Testing air and noise level | During Operation | Infrastructure Development Office | No cost | RCIP |
| Biological environment | | | | | | | |
| Pre-construction Phase Issues | | | | | | | |
| Tree felling | <ul style="list-style-type: none"> Prior coordination will do before felling trees The permission letter will be taken from concerned department and ministry. | Throughout road corridor | Observation | Pre-construction Phase | Contractor/Supervision consultant | BoQ (NRs 1,800,506.00) | RCIP |
| Conversion of forest land | <ul style="list-style-type: none"> Some forest land (within formation width) will be diverted to pavement surface in the subproject road. | Throughout road corridor | Observation | Pre-construction Phase | Contractor/Supervision consultant | | Supervision consultant/RCIP |



Initial Environmental Examination (IEE) of Lubughat-Galpa-Doramba Road, Ramechhap District

| Environmental Impacts | Environmental Mitigation Measures | Approximate Location | How | When | Implementation | Mitigation Cost (NRs.) | Supervision/Monitoring |
|---|---|--------------------------|-------------|------------------------|-----------------------------------|---|----------------------------------|
|  Ministry of Federal Affairs and General Administration Rural Connectivity Infrastructure Project (RCIP) Project Coordination Unit Laligur | <ul style="list-style-type: none"> The support will be given for as compensation of loss forest land and plants | Throughout road corridor | Observation | Pre-construction Phase | Contractor/Supervision Consultant | NRs 1,518,694 For compensation of lost land, NRs 3,029,133 for plantation in compensated land and NRs 8,987,757 for compensatory plantation for lost tree | Supervision consultant/RCIP |
| Construction Phase | | | | | | | |
|  Ministry of Federal Affairs and General Administration Singha Durbar, Kathmandu | Clearing of forest land and trees, shrubs and herbs and habitat disturbance. <ul style="list-style-type: none"> Identify and seek approval from RCIP and MoFE for felling of trees Fuel wood will be banned for construction works. Subproject will pay for the plantation at least ten (10) numbers against one tree removed and protection cost for 5 years Total 1490 tree seedlings will be planted within the formation width at appropriate intervals Road side plantation (income generating plant) will be done to add up greenery in the project area wherever space is available | All the Forest area | Observation | During Construction | Contractor/Supervision Consultant | Construction contract | Supervision Consultant/RCIP/MoFE |
| Habitat Fragmentation or loss and Barrier to Wildlife Movement Corridor | <ul style="list-style-type: none"> Using narrow widths, lower vertical alignments, smaller cuts and fills, flatter side slopes and less clearing of vegetation will be adopted. Necessary warning signs shall be installed at Wildlife movement locations | All the Forest area | Observation | During Construction | Contractor | Construction contract | Supervision consultant/RCIP |

Initial Environmental Examination (IEE) of Lubughat-Galpa-Doramba Road, Ramechhap District

| Environmental Impacts | Environmental Mitigation Measures | Approximate Location | How | When | Implementation | Mitigation Cost (NRs.) | Supervision/Monitoring |
|---|---|--------------------------|-------------|---------------------|-----------------------------------|------------------------|-----------------------------|
| Use of forest product by construction workers and construction activities | <ul style="list-style-type: none"> Restrict the works to enter into the forest with prior permission from authority Payment will be made to purchase the firewood The workers will be aware to take precaution of forest fire | All the Forest area | Observation | During Construction | Contractor/Supervision Consultant | No Cost | RCIP |
| Damage of Aquatic Habitats | <ul style="list-style-type: none"> Precaution will be taken to not to throw the waste materials into water bodies Precaution will be taken not to throw disposal of excavated materials on water bodies Workers will be aware to keep the water clean The drivers will be aware to not to wash the vehicles in the stream | Throughout road corridor | Observation | During Construction | Contractor/Supervision Consultant | No Cost | RCIP |
| Disturbance of Biodiversity and Wildlife | <ul style="list-style-type: none"> Workers will be educated through an awareness program about the importance of biodiversity and wildlife for maintaining the ecosystem. It is recommended to work during day time to minimize the disturbances to the biodiversity and wildlife. Posting of environmental signboards have to be displayed in frequent wildlife movement zone The important biodiversity areas will be restricted to disturb | Throughout road corridor | Observation | During Construction | Contractor | No Cost | Supervision Consultant/RCIP |
| Operation Phase | | | | | | | |
| Impacts on forest resources | <ul style="list-style-type: none"> The pressure on forest and forest will be taken as serious illegal issue The workers will be strictly aware not to do illegal extraction of timber, fire wood and other forest resources Authority will be coordinated for any types of illegal activities like encroachment, logging, forest fire, | Throughout road corridor | Observation | During Operation | CFUG | No Cost | Division Forest Office |
| Wildlife disturbance | <ul style="list-style-type: none"> The signpost will be posted at the wild animal's movement site | All the Forest area | Observation | During Operation | CFUG | Construction contract | Division Forest Office |

Ministry of Federal Affairs and General Administration
Department of Local Infrastructure
Project Coordination Unit
Lalitpur



Initial Environmental Examination (IEE) of Lubughat-Galpa-Doramba Road, Ramechhap District

| Environmental Impacts | Environmental Mitigation Measures | Approximate Location | How | When | Implementation | Mitigation Cost (NRs.) | Supervision/Monitoring |
|--|--|--------------------------|-------------|------------------------|----------------|------------------------|-----------------------------|
| | <ul style="list-style-type: none"> The signboard will be hanged showing no horn, wild animals movement areas No entry into the forest at night Precaution and aware about the forest fire | | | | | | |
| Chemical environment | | | | | | | |
| Pre-Construction Phase Issues | | | | | | | |
| Use and storage of fuel, lubricants, oils, acids, and other chemicals for construction | <ul style="list-style-type: none"> Chemicals (oils, paints, acids etc.) will be stored in leak proof container and disposed in pit safely after use. Hazardous materials will not be stored near water sources Used lubricants and oils will be collected and recycled or disposed offsite. Plastic sheeting will be placed under hazardous material storage area to collect and retain leaks and spills. | Throughout road corridor | Observation | Pre-Construction Phase | Contractor | Construction contract | Supervision consultant/RCIP |
| Construction Phase | | | | | | | |
| Use of fuel, lubricants, oils, acids, and other chemicals for construction | <ul style="list-style-type: none"> Used lubricants and oils will be collected and recycled or disposed offsite. Chemicals (oils, paints, acids etc.) will be stored in leak proof container and disposed in pit safely after use. Hazardous materials shall not be stored near water sources Plastic sheeting will be placed under hazardous material storage area to collect and retain leaks and spills. Contaminated runoff from storage areas will be captured in ditches or ponds with an oil trap at the outlet. Contaminated and worn plastic sheeting will be packed into drums and disposed off site. | Throughout road corridor | Observation | Construction Phase | Contractor | Construction contract | Supervision consultant/RCIP |
| Use and Storage of chemicals like bitumen etc. | <ul style="list-style-type: none"> Bitumen drums will be stored in dedicated areas, not scattered along the road and any small accidental spills will be cleared up immediately | Throughout road corridor | Observation | Construction Phase | Contractor | Construction contract | Supervision consultant/RCIP |

Initial Environmental Examination (IEE) of Lubughat-Galpa-Doramba Road, Ramechhap District

| Environmental Impacts | Environmental Mitigation Measures | Approximate Location | How | When | Implementation | Mitigation Cost (NRs.) | Supervision/Monitoring |
|-------------------------|--|--------------------------|-----------------------|------------------|-----------------------------------|------------------------|------------------------|
| | <ul style="list-style-type: none"> Bitumen will be melted in heaters using kerosene, diesel or gas fuel. No bituminous material will be discharged into side drains. Bitumen will not be applied in strong wind or rainy conditions Fuel wood will not be used for heating bitumen. | | | | | | |
| Operation Phase | | | | | | | |
| Effect on water quality | <ul style="list-style-type: none"> Haphazard cleaning/ washing of vehicle and leakage of fuels and lubricants into water channel will be controlled | Throughout road corridor | Testing water quality | During operation | Infrastructure Development Office | No Cost | RCIP |



Table 9-4: Environmental Management Cost

| S.N. | Items | Cost (NRs.) | Included in BoQ |
|------|--|-------------------|-----------------|
| 1 | Compensatory Plantation and plantation in compensated land at the rate of 1600 trees per hectare and maintenance for 5 years | 12,016,890 | |
| 2 | Bioengineering measures | | 2,342,293 |
| 3 | Cutting of Trees | 1,800,507 | |
| 4 | Environmental Monitoring Cost | 860,000.00 | |
| 5 | Compensatory Land for forest | 1,518,694 | |
| 6 | Relocating electric poles | | 5,055,529 |
| 7 | Provision of Toe Wall at spoil disposal site | 34,629,260 | |
| 8 | Relocating water tank | 414,769 | |
| | Total Cost (NRs.) | 51,240,120 | |

Table 9-5: Environmental Monitoring Cost

| S.N. | Particulars | Unit Rate | Amount (NRs) | Remark |
|--------------------|---------------------------------------|---------------------------|-------------------|---|
| 1 | Water Quality Monitoring | 7 sites x 12 times x 5000 | 420,000.00 | Include test during for pre-construction phase, Construction phase and Implementation Phase |
| 2 | Noise Quality Monitoring | 2 sites x 12 times x 5000 | 120,000.00 | |
| 3 | Air Quality Monitoring | 2 sites x 12 times x 5000 | 120,000.00 | |
| 4 | Other Direct Observation (DoLI, RCIP) | 2 times x 100,000 | 200,000.00 | |
| TOTAL (NRs) | | | 860,000.00 | |


 Government of Nepal
 Ministry of Federal Affairs and General Administration
 Department of Local Infrastructure
 Rural Connectivity Improvement Project (RCIP)
 Project Coordination Unit
 Lalitpur




 Government of Nepal
 Ministry of Federal Affairs and General Administration
 Singha Durbar, Kathmandu

10 CONCLUSION

The environmental impacts of the proposed subproject for upgrading of proposed road are likely to have minimal adverse impacts on environment. Most of the impacts identified and predicted are of minimal, temporary, reversible and short-term nature associated with construction phase only.

The upgraded road will provide smooth, easy and quick access eliminating existing inconveniences of transport service. Consequently, the transportation of goods and services from subproject area to the city like Banepa, Kathmandu and other parts of the country will be easier, faster and cheaper.

Further beneficial impacts of upgraded road will be on human life, income generation from employment during the construction phase and enterprise development and commercialization during operational phase. Seed sowing on road embankment slopes and roadside plantation of trees will assist to avoid and minimize road side scouring, erosion and attenuation of noise and dust, and will enhance local environment.

Taking into consideration the nature of the proposal, its location, stakeholder's positive response, and evaluated environmental impacts, this IEE Study proposes to implement the Proposal under the condition that the safeguard measures described in the environmental management plan are implemented and monitored accordingly

Joint Venture
2076
Baneshwor, Kathmandu




REFERENCE

- National Environment Policy 2076 BS
- Climate Change Policy 2076 BS
- National Forest Policy 2075 BS (2017 AD)
- Policy Document, Environmental Assessment in the Road Sector of Nepal (2000 AD)
- Land Acquisition, Resettlement, and Rehabilitation Policy for Infrastructure Development Project 2071 BS (2015 AD)
- National Transport Policy 2058 BS (2002 AD)
- Land Use Policy 2075 BS (2017 AD)
- Safeguard Policy Statement of ADB 2009 AD
- Nepal Environmental Policy and Action Plan 1993
- Fifteenth Plan (2076/77 – 2080/81 B.S.)
- Nepal Road Safety Action Plan (2013 to 2020)
- Environment Protection Act 2076 BS (2019 AD)
- Environment Protection Regulation 2077 BS (2020 AD)
- Local Government Operation Act 2074 BS (2017 AD)
- Forest Act, 2076 BS (2019 AD)
- Forest Rules, 2051 BS (1995 AD)
- Land Acquisition Act 2034 BS (1977 AD)
- सङ्कटापन्न वन्यजन्तु तथा वनस्पति अन्तराष्ट्रिय व्यापार नियन्त्रण ऐन 2073 B.S (2017 A.D)
- Work Procedure with Standards for the Use of National Forest Land for National Priority Project, 2076
- Occupational Safety and Health Guidelines, (DoLIDAR 2017 A.D)
- Environmental and Social Management Framework (ESMF), DoR-GESU, GoN (2008 AD)
- Environmental Management Guidelines, GESU-DoR, GoN (1997 AD)
- Occupational Safety and Health Guidelines, DoLIDAR (2017)
- Roadside Bio-engineering Reference Manual, DoR, GoN (1999 AD)
- Roadside Bio-engineering Site Handbook, DoR, GoN (1999 AD)
- Roadside Geotechnical Problems: A Practical Guide to their Solutions, DoR, GoN (2007 AD)
- Batawaran Parichaya – Resource Book MoFALD 2070 BS
- National Environmental Impact Assessment Guidelines 2050 BS (1993 AD)
- Guideline related to extraction, sales and management of stone, aggregates and sand 2077 (ढुँगा, गिट्टी, वालुवा उत्खनन, बिक्री तथा व्यवस्थापन सम्बन्धी मापदण्ड २०७७)
- Nepal Road Standards 2070 BS (2014 AD)
- Nepal Vehicle Mass Emission Standard 2069 BS (2012 AD)
- National Ambient Air Quality Standards for Nepal 2060 BS (2003 AD)
- National Drinking Water Quality Standard of Nepal 2062 BS (2005 AD)
- Noise Level Standard of Nepal 2069 BS (2012 AD)
- Convention on International Trade in Endangered Species of wild fauna and flora (CITES 1973 A.D.)
- Convention on the Biological Diversity (CBD, 1992 A.D.)
- ILO Convention 169
- United Nations Framework Convention on Climate Change (UNFCCC) 1992
- DOR, GESU. 2003. Reference Manual for Environmental and Social Aspects of Integrated Road Development, the Department of Roads, Ministry of Physical Planning and Works, Kathmandu.
- DOR, GESU, 2000. Policy Document (Draft), Environmental Assessment in the Strategic Road Network, Geo-Environment and Social Unit, Department of Roads Ministry of Physical Planning and Works, Kathmandu.
- Central Bureau of Statistics, Census 2011
- Terms of Reference of IEE Study of Lubughat-Galpa-Doramba Road, Ramechhap District, 2021
- Detailed Engineering Design Report Lubughat-Galpa-Doramba Road, Ramechhap District, 2021



Appendix 1

Declaration from Expert Team


Ministry of Federal Affairs and General Administration
Rural Department of Local Infrastructure
Rural Connectivity Improvement Project (RCIP)
Project Coordination Unit
Lalitpur




Ministry of Federal Affairs and General Administration
Singha Durbar, Kathmandu

Declaration from IEE Study Team Members

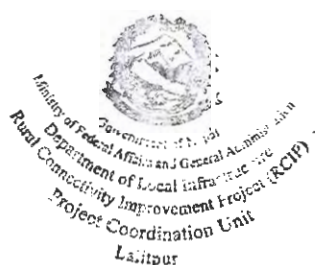
Title of the Report: IEE of Lubughat-Galpa-Doramba Road

We declare the following;

19. We have conducted the study professionally using acceptable and standard methodology;
20. The study findings are correct to the best of our knowledge and have not been altered in any manner
21. We shall be accountable for misleading information in the part of this report related to our area(s) of Study

Name, designation and signature of study team

| Name | Designation | Signature |
|----------------------------|------------------------------------|---|
| Dwarika Phuyal | Team Leader/Environment Expert |  |
| Er. Sashi Shrestha | Road Engineer |  |
| Mr. Bishow Poudel | Natural Resource Management Expert |  |
| Mr. Subash Chandra Ghimire | Socio-economic Expert |  |
| Deepak Chhetree | Geotechnical Engineer |  |



FORM TECH-6: CURRICULUM VITAE (CV)

| | |
|------------------------|-----------------------------|
| Position Title and No: | Environmental Expert |
| Name of Firm: | Aviyaan Consulting (P).Ltd. |
| Name of Expert: | Mr. Dwarika Phuyal |
| Date of Birth: | 19 th May 1971 |
| Citizenship: | Nepali |

Education :

- Master's of Science in Environmental Engineering; TU/2002
- Bachelor in Civil Engineering; TU/1998

Other Training :

- One Day Workshop on Environmental Safeguard Policy, 2009, Bhairahawa, 18th February, 2016 organized by ADB.
- A Ten day training to DDC engineers, overseers and staffs on Initial Environmental Examination (IEE) organized by DDC Palpa, January 2006 (as a trainer)
- A Ten day training to engineers and overseers on small rural infrastructures management and Environmental Study for GTZ/PASRA districts implemented by GTZ (as a Trainer) March, 2009

Employment Record Relevant to the Assignment :

| Period | Employing Organization and Title / Position. Contact Information for References | Country | Summary of Activities Performed Relevant to the Assignment |
|--|---|---------|---|
| January 2022 to date | Aviyaan Consulting (P).Ltd. Position Held: Environmental Expert Type of Employment: Full Time Reference Information: Name: Mr.Prashant Malla, MD | Nepal | Carry out IEE study of 15 road projects in different districts of Bagmati Province of RCIP/DoLI project |
| March 2017 to June 2021 | Building Design Authority(P).Ltd. Position Held: Environmental Management / Safeguard Expert Type of Employment: Full Time Reference Information: Name: Mr.Khem Dallakoti, MD Tel: 01-4248200 E-mail:bdapvtltd@gmail.com | Nepal | Ensure all environmental requirements Assist the PIU in monitoring compliance with the EIA/ IEE and Resettlement Plans and any environmental and social development issues identified during supervision phase in co-ordination with PIU, PCO, NGOs and other stakeholders, Conduct training to relevant personnels |
| (April 2012 to August 2013) | Enviro- Tech Consult (P) Ltd Kathmandu Position Held: Environmental Management Expert Type of Employment: Part Time Reference Information: Name: Krishna Dev Shrestha, MD; Tel: 977-9851093003 E-mail: kids2064@gmail.com | Nepal | Carrying out Initial Environmental Examination (IEE) Collect Environmental Baseline Information, Identify, Predict and Evaluate Environmental Impacts and Suggest Mitigation Measures and Prepare Environmental Management Plan (EMP) and Prepare IEE Reports, conduct environmental training. |
| (August 2014 to August 2015) (July 2013 to July 2014) | Bright Future International (P) Ltd. Position Held: Team Leader (Environmental Management Expert) Type of Employment: Full Time Reference Information: Name: Mrs. Shova Kumari Paudel, MD Tel: 977-1-4102875 Mail:bf.international@gmail.com | Nepal | Carrying out Initial Environmental Examination (IEE) Study of Sewerage Systems, Waste Water, Treatment Plants; Collect Physical, Baseline information; Conducted public consultation meeting Identify, Evaluate and assessment of impacts; Prepare EMP; IEE conduct environmental training. |
| Nov 2011 to Feb 2015 | MSV International Inc. (USA) in association with CIS / GOEC / Technocrats Consultancy (P) Ltd. Position Held: Water Treatment Expert cum Environmental Management Expert Type of Employment: Part Time Reference Information: Name: Mr. Saneev Kumar MD, CIS; Tel: 977- | Nepal | Collecting and assessing water quality parameters of existing sources and proposed ground water sources along with other baseline Information; Water quality sampling and assessing of ground water and surface water nearby proposed Sanitary Land Fill Site |

Ministry of Federal Affairs and General Administration
Department of Local Infrastructure Development
Project Coordination Unit
Lalitpur



| | | | |
|-----------------------------|---|-------|--|
| April 2009 to November 2010 | 9851077071 ICT International (New Delhi) In Association with Full Bright-Soil-Test and Himat Integrated Position Held: Environmental Management Expert Type of Employment: Full Time Reference Information: Name: Mr. Lal Krishna K.C, Full bright Tel: 977-1- 4468749 E-mail: fbc@mos.com.np | Nepal | Construction supervision, Implementing Environmental and social safeguards measures; Monitoring of implementation of Environmental Management plan during construction stage of project; of Satbanjh-Tripurasundari - Jhulaghat and Satbanjh-Gokuleshwor Road (North South Highway, 65 km in length) upgrading Projects to Ottaseal standard Baitadi and Darchula District |
| October 2006 to March 2008 | IDRS (P) Ltd. Position Held: Team Leader / Environmental Management Expert Type of Employment: Full Time Reference Information: Name: Mr. Ram Chandra Poudel Tel: 977-1- 4109185 E-mail: idrs@wlink.com.np | Nepal | Carry out Initial Environmental Examination; Carry out walk over Survey, IEE and Detail Survey and Design; Monitoring of implementation of Environmental management Plan during Construction of road |
| October 2004 to March 2006 | IDRS (P) Ltd. Position Held: Environmental Engineer Type of Employment: Full Time | Nepal | Carry out Initial Environmental Examination; Carry out walk over Survey, IEE and Detail Survey and Design; Monitoring of implementation of Environmental management Plan during Construction of road |

Membership in Professional Associations and Publications:

- Member, Nepal Engineering Council; Membership No.: 2672 "Civil, A"
- Member, Nepal Engineers' Association

Language Skills

| | <u>Reading</u> | <u>Writing</u> | <u>Spoken</u> |
|----------------|----------------|----------------|---------------|
| Nepali | Excellent | Excellent | Excellent |
| English | Good | Good | Good |
| Hindi | Good | Good | Good |

Adequacy for the Assignment

| Detailed Tasks Assigned On Consultant's Team Of Experts: | Reference To Prior Work/Assignments That Best Illustrates Capability To Handle The Assigned Tasks |
|--|--|
| <p>As an Environmental Management Expert, he shall be responsible to;</p> <p>As the Environmental Safeguard Expert, Mr.Phuyal will be responsible but not be limited to the following:</p> <p>(i)undertake a rapid environmental assessment for potential environmental impacts including climate change and identify the level of impacts to confirm the project's environmental categorization of municipal infrastructures and urban planning projects. ii) identify applicable acts, rules, procedures and guidelines to manage the environmental and social safeguard impacts based on national and state government requirements.</p> <p>(iii) prepare appropriate frameworks or documents depending on lending and project modality, which may include safeguard system assessments, environmental review and assessment framework, or initial environmental examinations (IEE) incorporating environmental management plans (EMPs).</p> | <p>Name of Assignment or Project: Regional Urban Development Project (RUDP);Institutional Development Consultant (IDC) in Sudurpachhim Pradesh (Funded by ADB) Month and Year: October 2019 –April 2020 (7man-months) Location: Dhangadhi Sub-Metropolitan City-Province-7 (Sudurpachhim Pradesh) Client: Project Coordination Office (PCO), Department of Urban Development and Building Construction (DUDBC), Babarmahal Main Project Features: strengthen capacity of project municipalities for improving municipal asset management, strengthen municipal revenue mobilization and financial management capacity, improve urban planning, implement mainstream GESI in project municipalities, effective implementation of performance based grant etc. Project Cost: \$214 million. Position Held: Environmental Management Expert Activities Performed: Responsible for managing the overall implementation of the environmental management component of institutional strengthening of municipalities from an environmental management technical working group in municipality; carry out meetings and monitoring of land acquisition issues and environmental protection issues, Building capacity of technical working group by organizing training programs and technical support;</p> |

| | |
|---|---|
| <p>(iv) work closely with executing/implementing agencies and the design team to incorporate IEE findings and EMP measures into designs, including adaptation and mitigation measures of climate change, if needed;</p> <p>(v) carry environmental assessments IEE or EIA, prepare site specific EMP as per prevailing, Environmental Protection Acts and Regulations.</p> <p>assess the capacity of government agencies to implement relevant safeguard measures and provide necessary capacity building supports for each of</p> <ul style="list-style-type: none"> • government agency. | <p>Working with the DSC to design municipality specific management models for FSM which clearly identifying institutional / stakeholder roles and responsibilities, FS collection and transportation options, FS treatment and reuse options etc. Providing support for preparing municipal environmental management and monitoring guidelines, and for their application; Providing support for integrating EM reporting in the regular reporting requirements of the municipalities; documentation needed to report on environmental management institutional development components.</p> |
|---|---|

Name of Assignment or Project: Regional Urban Development Project (RUDP), Design and Supervision Consultant for Biratnagar Sewerage, Roads, Drainage Works and Integrated Solid Waste Management Design (ADB funded) **Month and Year:** October 2017 to till date (6 Man-month) **Location:** Biratnagar Sub-metropolitan City **Client:** PIU, Biratnagar Sub Metropolitan City **Positions held:** Environment Safeguard Expert **Activities performed:** Ensure all environmental requirements as reported in the EIA/IEE are incorporated into the bidding and contract documents; Assist the PIU in monitoring compliance with the EIA/ IEE and Resettlement Plans and any environmental and social development issues identified during supervision phase, Assist the PIU in updating and implementing the Environment Management Plan (EMP) and establishing a system and training staff to monitor the project's environmental indicators, implementing and monitoring the environmental management, environmental safeguard plans, environmental impact mitigation activities & impact assessments; review the data collected for the first year to evaluate the effectiveness with which the environmental mitigation and monitoring measures are implemented and recommend actions to be taken in accordance with ADB's Safeguards Policy Statement (2009) and EIA/IEE prepared for the Project; Assist the PIU in monitoring and enforcing, as detailed out in Safety Manual, the measures taken to ensure safety of the workers, other project personnel, general public and works; Support PIU for conducting regular review meetings, public hearings and public audit to seek opinions for improvement.

Name of Assignment or Project: Urban Governance and Infrastructure Improvement Project (Funded by World Bank) **Year:** March 2018 to till date (8 mm) **Location:** Jiri, Tilottama and Ramgram municipalities **Client:** Jiri, Tilottama and Ramgram municipalities **Main Project Features:** Feasibility study and DPR preparation of various urban infrastructures like roads, bridges, sewerage and drainage, water supply, solid waste management, municipal buildings, preparation of master plan of infrastructure project, towers, periodic and district development plan within project area. **Urban roads & utilities in Jiri Municipality, Urban roads & utilities Ramgram Municipality, Urban roads & utilities Tilottama Municipality Project Cost:** US \$ 40 million **Position held:** Environment Safeguard Expert **Activities performed:** Responsible for detailed feasibility study, field visit, environmental baseline data collection, preparation of inception and feasibility reports with environmental assessment and environmental management Plan, filling environmental screening checklist and recommend whether or not IEE/EIA study required or not as per EPA and EPR 1997; establish the environmental management & safeguard criteria for preparing design & bid documents, advise on environmental related concerns during project design and recommend corrective measures; design of environmental impact mitigation activities; involved in consultation meetings and workshops for the Project, Provide training to local communities.

Name of assignment or project: Feasibility study, detailed engineering survey, design drawings, bid document and DPR preparation of Hetauda, Baglung, Mangadh and Devdah Urban Town Co-financing WSS². **Month and Year:** January 2018 to July 2018 (2 mm) **Location:** Urban area of Hetauda Sub-metropolitan City of Makwanpur District, Baglung Municipality of Baglung District, Biratnagar Metropolitan City of Morang District and Devdaha Municipality of Rupandehi District **Client:** DWSS/ Hetauda City Water Supply Board, Baglung WUSC **Project Cost:** NRs. 2.11 billion **Position Held:** Environmental Specialist **Activities Performed:** Carry out activities described in and/or that follows from the activities described in the scope of the work related to the field of consultant and those assigned by Team Leader; Anticipate the likely environmental impact of carrying out various subprojects and proactively plan to take necessary action so that implementation is not delayed; Prepare necessary TORs to carry out Initial Environmental Examination (IEE); Carry out IEE, as per the TORs; collect & assess environmental parameter; prepare environmental management plan (EMP) & Environmental Safeguard Plan; during the detailed design

phase, review and revise various environmental reports prepared during the feasibility study phase; identify, predict and evaluate environmental impacts and suggest mitigation measures and prepare environmental management plan; environmental impact assessment proactively anticipate and carry out any other activity as per the scope of work.

Name of assignment or Project: Design and Construction Supervision of Gautam Buddha International Airport Upgrading Component (GBAUC) Project (ADB Funded) **Year:** March 2016 to To August 2017 [Intermittent- 6 Man Months], **Location:** Siddhartha Municipality **Client:** Civil Aviation Authority, Siddharthanagar Municipality **Total Project Cost:** Aprox. NRs. 600 Million **Position held:** Environmental Management / Safeguard Expert **Activities Performed:** Environmental Monitoring Site Visit, Preparation of Environmental Monitoring Checklist, Construction Supervision and Monitoring, Check and verify mitigation measures whether or not EMP compliance including ADB Safeguard Policy 2009, Preparation of monitoring reports and provide training on environmental monitoring guideline.

Name of assignment or project: Carrying out Initial Environmental Examination of various water supply projects **Year:** August 2014 to August 2016 (20 mm) **Location:** Nepal **Client:** Department of Water Supply and Sewerage **Total Project Cost:** Aprox. NRs 50 Million **Position Held:** Team Leader (Environmental Management Expert) **Activities Performed:** Carrying out Initial Environmental Examination (IEE) Study of 3 Sewerage Systems and Waste Water; Treatment Plants (Hastinapur, Kathmandu, Betini, Nuwakot, Manthali, Ramechhap); Carrying out Initial Environmental Examination (IEE) Study of 2 Water Supply and Sanitation Projects; (Sundar Water Supply and Sanitation Project, Khairahani, Chitwan and Manthali Water Supply and Sanitation Project, Manthali, Ramechhap) implemented by Department of Water Supply and Sewerage, Panipokhari; Collect Physical, Baseline information; Conducted public consultation meeting; Identify, Evaluate and assessment of impacts; Prepare EMP; Prepare detail IEE Reports and present in Ministry, provide training on environmental monitoring guideline.

Name of assignment or project: Design & supervision of Secondary Towns Integrated Urban Environmental Improvement Project (STIUEIP), Butwal (ADB funded) water supply, Solid Waste Management and Auto Village components **Year:** November 2011 to August 2014 (intermittent, 10 mm) **Location:** Butwal Municipality **Client:** PIU, Butwal Sub-Metropolitan City **Total Project Cost:** Approx US\$: 115 Millions **Position Held:** Water Treatment Expert cum Environmental Management Expert **Activities Performed:** Collecting and assessing water quality parameters of existing sources and proposed ground water sources along with other baseline Information; Conduct feasibility study, Design and estimate of water treatment facilities in Butwal Municipality 9 & 10; Water quality sampling and assessing of ground water and surface water near by proposed Sanitary Land Fill Site at Butwal 9; Involved in Environmental Screening and Preparing Terms of Reference (TOR) and Initial Environmental Examination (IEE) report of Water Supply and Sanitation Component of Secondary Towns Integrated Urban Environmental Improvement Project (STIUEIP/ ADB); Assist in collection of environmental base line information for Preparing TOR, Scoping and Environmental Impact Assessment (EIA) study of Solid Waste Management of Butwal Municipality. Review of EPA and EPR 1997, Solid Waste Management Act and regulation, Preparation of TOR, Scoping Documents for EIA of Solid Waste Management with development of Sanitary Land Fill Site of STIUEIP, Butwal Municipality; Collect Environmental Baseline Information, Identify, Predict and Evaluate Environmental Impacts and Suggest Mitigation Measures and Prepare Environmental Management Plan (EMP) and Prepare IEE and EIA Reports and Present in Ministry of Urban Development, provide training on environmental monitoring guideline.

Name of assignment or project: Carrying out Initial Environmental Examination (IEE) Studies **Year:** July 2013 to July 2014 (12 mm) **Location:** Lalitpur **Client:** Department of Water Supply and Sewerage **Total Project Cost:** Approx. NRs 300 Million **Position Held:** Team Leader/ Environmental Management Expert **Activities Performed:** Carrying out Initial Environmental Examination (IEE) Studies of waste Water Treatment Plants at Harisiddhi and Thaiba Lalitpur implemented by DWSS, Divisional Office Lalitpur; Carrying out Initial Environmental Examination (IEE) Study of Building Construction and Operation; Of Building of Department of Water Supply and Sewerage, Panipokhari; Carrying out Initial Environmental Examination of sustainable collection/extraction of Stone, gravel and sand from 4 rivers of Sunsari District; Collect Environmental Baseline Information, Identify, Predict and Evaluate Environmental Impacts and Suggest Mitigation Measures and Prepare Environmental Management Plan (EMP) and Prepare IEE Reports and Present in Concerned Ministries; Review of EPA 2053 and EPR 2054 and other Government Policies and Guidelines including Environmental Impact Assessment Guidelines, provide training on environmental monitoring guideline.

Name of assignment or project: Carrying out Initial Environmental Examination (IEE) of buildings and rivers **Year:** April 2012 to August 2013 (10 mm) **Location:** Nepal **Client:** Various **Position Held:** Environmental Management Expert **Activities Performed:** Carrying out Initial Environmental Examination (IEE) of Kathmandu Fur Park Bhaktapur, Carrying out Initial Environmental Examination (IEE) of Milestone

International College, Civil Engineering and Management Blocks, Balkumari, Lalitpur; Carrying out Initial Environmental Examination of sustainable collection/extraction of Stone, gravel and sand from 13 rivers of Arghakhanchi District and 6 Rivers of Palpa District; Collect Environmental Baseline Information, Identify, Predict and Evaluate Environmental Impacts and Suggest Mitigation Measures and Prepare Environmental Management Plan (EMP) and Prepare IEE Reports and Present in Concerned Ministries; Review of EPA 2053 and EPR 2054 and other Government Policies and Guidelines including Environmental Impact Assessment Guidelines, provide training on environmental monitoring guideline.

Name of assignment or project: Satbanjh- Tripurasundari - Jhulaghat and Satbanjh- Gokuleshwor Road (North South Highway, 65 km in length) upgrading Projects **funded by World Bank** **Year:** April 2009 to May 2012 (35 mm) **Location:** Baitadi and Darchula District **Client:** Department of Road **Position Held:** Environmental Management Expert **Activities Performed:** Implementing Environmental and social safeguards measures; Monitoring of implementation of Environmental Management plan during different stages of project; Construction supervision and EMP Implementation and monitoring and implementation of Mitigation measures of (North South Highway, 65 km in length) upgrading Projects to Ottaseal standard Baitadi and Darchula District, Nepal and provide training on environmental issues.

Name of assignment or project: Design and Construction Supervision of Khalanga - Rimna road section under Decentralized Rural Infrastructure Livelihood Project (DRILP) **funded by ADB** **Year:** October 2006 to March 2009 (29 mm) **Location:** Jajarkot **Client:** DoLIDAR **Total Project Cost:** Approx. NRs.110 Million **Position Held:** Team Leader/ Environmental Management Expert **Activities Performed:** Carry out Initial Environmental Examination of Khalanga - Rimna road section; Carry out walk over Survey, IEE and Detail Survey and Design; Monitoring of implementation of Environmental management Action Plan during Construction of road; Review of prevailing GoN EPA, EPR and other procurement act regulation and guidelines during the study and project implementation; Socio- Economic study, feasibility and Detail Engineering Design and Estimate and construction supervision of Overall social and Technical Team Management; Overall project management Prepare study and project reports, provide training on environmental monitoring guideline.

Name of assignment or project: Detail Engineering Survey, Design and Cost Estimate of Tansen Water Supply and Sanitation Project **Year:** November 2005 to August 2006 (5 mm) **Location:** Tansen Municipality **Client:** DWSS/ Tansen Water Supply and Sanitation Project **Total Project Cost:** Approx. NRs. 30 Million **Position Held:** Deputy TL/ Environmental Management Expert **Activities Performed:** Carry out Initial Environmental Examination; Carry out walk over Survey, IEE, Detail Engineering Survey, Design and Cost Estimate of Tansen Water Supply and Sanitation Project (Rehabilitation project with addition of new source, new RVTs, renovation of existing structures, replacing old pipe and adding pumps) Palpa, Nepal; Feasibility study, water quality assessment of Sisne Spring Source and assessment and improvement of existing source at Bhulke; New demand assessment, socio-economic study, household survey and stakeholders and public consultation meeting; Pumping system from source to RVT at Batase Danda; Detail Survey of transmission and distribution networks; Preparation of Detail Design and Cost estimate, provide training on environmental monitoring guideline.

Name of assignment or project: Urban Environment Improvement Project Bharatpur **funded by ADB** **Year:** July 2006 to July 2007 (12 mm) **Location:** Bharatpur Municipality **Client:** PIU/ Bharatpur Municipality **Total Project Cost:** NRs. 400 million **Position Held:** Environmental Management Expert **Activities Performed:** Carry out Initial Environmental Examination of Urban Environment Improvement Project Bharatpur Water Supply Sub- Project Scheme II and Scheme III and Waste Water Treatment Plant (Wetland); Collection of baseline information and conduct feasibility and detail survey; Prepare Feasibility design and IEE reports; Prepare IEE study reports and present in MoWPP; Review of EPA 1996 and EPR 1997 of GoN and various Environmental assessment guidelines and other various relevant acts, regulation, Manuals & Guidelines and provide training on environmental monitoring guideline.

Name of assignment or project: Carry out IEE studies of Roads **Year:** Oct. 2004 to July 2006 (12 mm) **Location:** Sindhuli and Rukum **Client:** DDC/GoN, **Position Held:** Environmental Engineer **Activities Performed:** Involved in preparation of ToR, Site survey, public consultation, Preparation of IEE reports of Khurkot-Khangsang Road, Sindhuli (40Km), Chaurjahari-Musikot Road (45 Km) and Musikot-Chunban-Chaukhabang Road, Rukum

Name of assignment or project: Construction supervision of Kathmandu Water Supply Improvement Facilities Project at Bode, Bhaktapur **implemented by JICA** **Year:** July 2002 to September 2004 (12 mm) **Location:** Bhaktapur **Client:** KUKL, Kathmandu Water Supply Improvement Facilities Project **Position Held:** Environmental Engineer / Water Supply and Sanitary Engineer **Activities Performed:** Involved in preparation & implementation of environmental management plan and construction supervision, Construction of river intake, Sedimentation tank, Clear water reservoir, treatment facilities (Rapid sand Filter of Capacity 20 MLD), RCC overhead tanks and distribution system within the Kathmandu valley. Auto

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Lalitpur

Ministry of Federal Affairs and Coordination
Singha Durbar, Kathmandu

CAD and quantity survey, preparation of bills, preparation of EMP & training related to environmental issues.

Expert's Contact Information: (E-mail: dwarikaphuyal@yahoo.com, Phone: + 977-9851086137)

Certification:

I, the undersigned, certify that to the best of my knowledge and belief, these data correctly describe me, my qualifications, and my experience.



[Signature of Staff member and authorized representative of the consultant]

Date: 18/05/2022

Day/ Month/ Year



CURRICULUM VITAE (CV)

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--------------------|---|---|--|--|--|---------------|------------------|-----------|-----------|----------------|----------------|----------------------------|--------------------|--------------|------------------|--------------|-----------|---|----------------|----------------------------|--------------------|-----------|------------------|---------------|-----------|---|----------------|------------------------------------|--------------------|---------------|
| 1. | Proposed Position: | Social Safeguard Specialist | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2. | Name of Firm: | Card Consult (P) Ltd. | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3. | Name of Expert: | Subash Chandra Ghimire | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4. | Current Residential Address: | Nepal | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Telephone No.: | 9851157468 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | E-Mail Address: | subashcghimire@gmail.com | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5. | Date of Birth: | 29 th June 1975 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Citizenship: | Nepali | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6. | Education: | <ul style="list-style-type: none"> - MPhil, Sociology, Tribhuvan University Campus Kirtipur, (Under Thesis) - Master's Degree, Sociology, Tribhuvan University Campus Kirtipur, 2007-2009 - B.A, Sociology and English, Mahendra Multiple Campus Dang (T.U.) 2005 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7. | Membership in Professional Associations: | <ul style="list-style-type: none"> - Member, Sociological/Aanthropological Society of Nepal (SASON) | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8. | Other Trainings: | <ul style="list-style-type: none"> - TOT on Communication Skill Development Training, Jointly organized by Public Progress Social Development Center, Dang and Alliance West Nepal Pokhara at Tribhuvannagar Municipality Ghorahi Dang from 28 July to 6 August 2001. - General Banking Course (from KFA) - Short course on MS SPSS-PACKAGE, the course consisted of 30 hours of instruction from 19 August to 2 September 2011 From T.U./I.O.E./C.E.D. - Training on Management of Land Acquisition, Resettlement and Rehabilitation (MLARR) For Senior Executive of DOR and Stakeholders, organized jointly by RSSDU and RHF from January 17-19, 2013. - Short course on QGIS Basic package, the course consisted of 42 hours of instruction from October 2017 from T.U./I.O.E./C.E.D, Pulchowk Lalitpur. | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 9. | Counties of Work Experience: | Nepal | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10. | Languages | <p>Nepali</p> <p>English</p> <p>Hindi</p> <p>Tharu</p> | <p>Speaking</p> <p>Mother tongue</p> <p>Good</p> <p>Good</p> <p>Good</p> <p>Good</p> | <p>Reading</p> <p>Good</p> <p>Good</p> <p>Good</p> <p>Good</p> | <p>Writing</p> <p>Good</p> <p>Good</p> <p>Good</p> <p>Good</p> | | | | | | | | | | | | | | | | | | | | | | | | | |
| 11. | Employment Record | <table border="1"> <tr> <td>From [Month/Year]:</td> <td>November 2018</td> </tr> <tr> <td>To [Month/Year]:</td> <td>Till Date</td> </tr> <tr> <td>Employer:</td> <td>CSSID (P).Ltd.</td> </tr> <tr> <td>Position held:</td> <td>Social/Resettlement Expert</td> </tr> </table> <table border="1"> <tr> <td>From [Month/Year]:</td> <td>January 2018</td> </tr> <tr> <td>To [Month/Year]:</td> <td>October 2018</td> </tr> <tr> <td>Employer:</td> <td>China Railway First Survey and Design Institute Group Co., Ltd. in (FSDI) JV with Pyunghwa Engineering Consultants Ltd., Korea (PEC), Dong Myeong Engineering Consultants (DMEC) & Architecture Co., Ltd and SILT Consultants (P).Ltd. In association with Tech Studio of Engineering (P).Ltd and ERM (P). Ltd.</td> </tr> <tr> <td>Position held:</td> <td>Social/Resettlement Expert</td> </tr> </table> <table border="1"> <tr> <td>From [Month/Year]:</td> <td>July 2017</td> </tr> <tr> <td>To [Month/Year]:</td> <td>December 2017</td> </tr> <tr> <td>Employer:</td> <td>Government of Nepal, Department of Road, Bridge Branch, Chakupat Lalitpur</td> </tr> <tr> <td>Position held:</td> <td>Senior Social Safeguard Consultant</td> </tr> </table> <table border="1"> <tr> <td>From [Month/Year]:</td> <td>February 2014</td> </tr> </table> | | | From [Month/Year]: | November 2018 | To [Month/Year]: | Till Date | Employer: | CSSID (P).Ltd. | Position held: | Social/Resettlement Expert | From [Month/Year]: | January 2018 | To [Month/Year]: | October 2018 | Employer: | China Railway First Survey and Design Institute Group Co., Ltd. in (FSDI) JV with Pyunghwa Engineering Consultants Ltd., Korea (PEC), Dong Myeong Engineering Consultants (DMEC) & Architecture Co., Ltd and SILT Consultants (P).Ltd. In association with Tech Studio of Engineering (P).Ltd and ERM (P). Ltd. | Position held: | Social/Resettlement Expert | From [Month/Year]: | July 2017 | To [Month/Year]: | December 2017 | Employer: | Government of Nepal, Department of Road, Bridge Branch, Chakupat Lalitpur | Position held: | Senior Social Safeguard Consultant | From [Month/Year]: | February 2014 |
| From [Month/Year]: | November 2018 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| To [Month/Year]: | Till Date | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Employer: | CSSID (P).Ltd. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Position held: | Social/Resettlement Expert | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| From [Month/Year]: | January 2018 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| To [Month/Year]: | October 2018 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Employer: | China Railway First Survey and Design Institute Group Co., Ltd. in (FSDI) JV with Pyunghwa Engineering Consultants Ltd., Korea (PEC), Dong Myeong Engineering Consultants (DMEC) & Architecture Co., Ltd and SILT Consultants (P).Ltd. In association with Tech Studio of Engineering (P).Ltd and ERM (P). Ltd. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Position held: | Social/Resettlement Expert | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| From [Month/Year]: | July 2017 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| To [Month/Year]: | December 2017 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Employer: | Government of Nepal, Department of Road, Bridge Branch, Chakupat Lalitpur | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Position held: | Senior Social Safeguard Consultant | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| From [Month/Year]: | February 2014 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

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| To [Month/Year]: | July 2017 |
| Employer: | Government of Nepal, Department of Road, Bridge Branch, Babarmahal Kathmandu |
| Position held: | Implement Support consultant (Social Safeguard Consultant) |
| From [Month/Year]: | May 2010 |
| To [Month/Year]: | February 2014 |
| Employer: | MMM Group Ltd. (Canada), SAI Engineering Ltd (India), in association with ITECO Nepal (P) Ltd., – Total Management Service (P) Ltd. |
| Position held: | Social Safeguard Consultant |
| From [Month/Year]: | September 2009 |
| To [Month/Year]: | May 2010 |
| Employer: | Rainbow F. M. (Nepal F.M.) |
| Position held: | Marketing Manager |
| From [Month/Year]: | May 2005 |
| To [Month/Year]: | July 2006 |
| Employer: | District Development Committee |
| Position held: | Information Assistant |
| From [Month/Year]: | July 2004 |
| To [Month/Year]: | May 2005 |
| Employer: | Sunrise Rosin and Turpentine Pvt. Ltd. |
| Position held: | Public Hearing Officer |
| From [Month/Year]: | January 2004 |
| To [Month/Year]: | May 2004 |
| Employer: | Bhawani Chemicals Pvt. Ltd. |
| Position held: | Socio-Economic Researcher |
| From [Month/Year]: | December 2002 |
| To [Month/Year]: | December 2003 |
| Employer: | Geological and Engineering Consultancy Pvt. Ltd. |
| Position held: | Manager |
| From [Month/Year]: | July 1998 |
| To [Month/Year]: | November 2002 |
| Employer: | Public Progress Society Development Centre (PPSDC) |
| Position held: | Office Secretary |



| 12. Detailed Tasks Assigned on consultant's Team of Experts: | 13. Work Undertaken that Best Illustrates Capability to Handle the Tasks Assigned |
|--|---|
| <ul style="list-style-type: none"> ◆ Document the social features and profile along the alignment for each road during transect walks; ◆ prepare the record of community participation during the field visits to the project communities to assess whether the CPF requirements are generally met; ◆ identify the project-affected persons based on techniques like rapid participatory appraisals (PRA), fully involving all stakeholders through community meetings, interviews of randomly selected affected persons with a set of questionnaires, secondary and other available data. ◆ Identify all the land and structures that will be affected along the proposed alignment. ◆ Prepare CPP and GESI reports, the detailed inventory of the land and affected structures same as using resettlement, census survey, covering 100% affected households along the alignment. ◆ Based on the survey, prepare support/assistance provisions for the project affected persons with particular attention to the vulnerable groups. ◆ Prepare reports for social and gender aspects. | <p>Name of Project or Assignment: Earthquake Emergency Assistance Project (EEAP) and Saptakoshi High Dam Multipurpose Project & Sunkoshi Storage cum Diversion Scheme; Year: 1st Nov 2018 to Till Date; Location: Nepal; Client: Government of Nepal, Nepal Reconstruction Authority.</p> <p>Central Level Project Implementation Unit Grant Management and Local Infrastructure Jwagal, Lalitpur, Nepal</p> <p>Government of Nepal, Ministry of Energy, Water Resource & Irrigation, Department of Electricity Development, Saptakoshi High Dam Multipurpose Project & Sunkoshi Storage cum Diversion Scheme, Biratnagar, Nepal.; Main Project Features: Design and construction supervision of roads; Position Held: Social/ Resettlement Expert / Team Leader; Activities Performed: Expert service for consultation meeting with stakeholders (Local Body, Line agencies, Local peoples etc.), To Identify asset loss (Private/Governmental/Community) towards proposed road alignment, and preparation of Resettlement Action Plan / Social Safeguard Report etc. of 13 roads in 7 Districts.</p> <p>Name of Project or Assignment: Detailed Engineering Survey and design of Electrified Railway Line for Mechi- Mahakali Railway.; Year: 1st January 2018 To 31st October 2018; Location: Nepal; Client: Department of Railway; Rail, Metrorail and Monorail Development Project, Bishal Nagar Kathmandu.; Main Project Features: Detailed survey and design of Railway; Position Held: Social/Resettlement Expert; Activities Performed: Expert service for consultation meeting with stakeholders (Local Body, Line agencies, Local peoples etc.), To Identify assets loss of Private/Governmental/Communities towards proposed rail alignment, preparation of Resettlement Action Plan and Environmental Impact Assessment Report etc.</p> |
| <p>Name of Project or Assignment: Bridge Project (Bridge Improvement and maintenance Program); Year: July 2017 To 19th December 2017; Location: Nepal; Client: DoR/WB IDA; Main Project Features: Feasibility study and construction supervision of Bridges; Position Held: Implement Support consultant (Social Safeguard Consultant); Activities Performed: Consultants' services is to support divisions in compliance monitoring of environmental and social safeguard measures adopted in project specific EMAP, SAP and RAP during construction and maintenance.</p> <p>The specific objectives of consulting services include:</p> <ul style="list-style-type: none"> • update and verification of project specific EMAP, SAP and RAP and other safeguard measures, • effective support to the technical team by minimizing/resolving social conflict during bridge construction, • preparation of list of PAFs and SPAFs for the livelihood assistance, • equally reporting the progress and any short comes to the GESU for further improvements, • Provide information to the BRIDGE BRANCH, RD, CSSE, and respective DoRs. • Support bridge project and GESU effectiveness on social and environmental safeguard – increase results on the ground both short and long term • Review the project specific EMAP, SAP, and RAP and update and verify if necessary. • Review the World Bank's and Government of Nepal's acts, rules, regulation and guidelines related to social and environmental safeguard and land acquisition. • Maintain compliance monitoring of approved project specific EMAP, SAP and RAP • Identify the environmental and social issues, if any not included in EMAP, SAP and RAP, during the course of implementation and report immediately to the GESU for further improvement; • Carry out the field study and conduct the meetings and discussion with various stakeholders including concern VDCs, public and private institutions, NGOs, local people to identify social environmental concern and to identify and verify the PAFs and SPAFs. • Prepare livelihood assistance strategy to the PAFs and SPAFs and other social safeguard program after coordination with GESU/Client • Report timely any critical issues on environmental and social safeguard to the BRIDGE BRANCH and GESU for correction and improvement in standard format agreed with GESU. | |

- Submit Monthly Progress Report, Status Report and other reports to the Bridge Branch/GESU in standard format.

Name of Project or Assignment: Bridge Project (Bridge Improvement and maintenance Program); **Year:** 13th February 2014 To July 2017; **Location:** Nepal; **Client:** DoR/WB IDA; **Main Project Features:** Feasibility study and construction supervision of Bridges; **Position Held:** Implement Support consultant (Social Safeguard Consultant); **Activities Performed:** Consultants' services is to support divisions in compliance monitoring of environmental and social safeguard measures adopted in project specific EMAP, SAP and RAP during construction and maintenance.

The specific objectives of consulting services include:

- update and verification of project specific EMAP, SAP and RAP and other safeguard measures,
- effective support to the technical team by minimizing/resolving social conflict during bridge construction,
- preparation of list of PAFs and SPAFs for the livelihood assistance,
- equally reporting the progress and any short comes to the GESU for further improvements,
- Provide information to the BRIDGE BRANCH, RD, CSSE, and respective DoRs.
- Support bridge project and GESU effectiveness on social and environmental safeguard – increase results on the ground both short and long term
- Review the project specific EMAP, SAP, and RAP and update and verify if necessary.
- Review the World Bank's and Government of Nepal's acts, rules, regulation and guidelines related to social and environmental safeguard and land acquisition.
- Maintain compliance monitoring of approved project specific EMAP, SAP and RAP
- Identify the environmental and social issues, if any not included in EMAP, SAP and RAP, during the course of implementation and report immediately to the GESU for further improvement;
- Carry out the field study and conduct the meetings and discussion with various stakeholders including concern VDCs, public and private institutions, NGOs, local people to identify social environmental concern and to identify and verify the PAFs and SPAFs.
- Prepare livelihood assistance strategy to the PAFs and SPAFs and other social safeguard program after coordination with GESU/Client
- Report timely any critical issues on environmental and social safeguard to the BRIDGE BRANCH and GESU for correction and improvement in standard format agreed with GESU.
- Submit Monthly Progress Report, Status Report and other reports to the Bridge Branch/GESU in standard format.

Name of Project or Assignment: Road Sector Development Project RSDP -2 (New Project Preparation and Supervision), Road Sector Development Project; **Year:** 19th March 2011 to February 2014; **Location:** Bajhang, Salyan and Rukum(Nepal); **Client:** DoR/WB IDA Grant No. H339-NEP; **Main Project Features:** Feasibility study and construction supervision of roads; **Position Held:** Social Safeguard Consultant

Activities Performed: Disseminate information to project affected people(PAP) On assets acquisition and compensation activities

Assist PAP in land acquisition, resettlement and rehabilitation activities based on GON and WB Guidelines and policy of Involuntary Resettlement.

Promote awareness campaign to PAF and local community, based on GON and WB policy.

Facilitate PAF and Compensation Determination Committee(CDC)

To provide compensation in time.

Conduct awareness program to minimize negative impact related with road construction activities.

RAP (Resettlement Action Plan) implementation as per Environmental and social Management framework Developed by Department of Road/ International Development Agency guideline of following roads:

- Kalagad – Chainpur Road (50km)
- Shitapati -Musikot Road (86km)

Name of Project or Assignment: Road Sector Development Project RSDP -2 (New Project Preparation and Supervision), Gokuleshwar – Thaktoli-Darchula Road (72KM), Shitapati-Musikot Road (86KM)and Khidkijal to Manma - Jumla road(109km)under Road Sector Development Project; **Year:** 6th May 2010 to 18th March 2011; **Location:** Darchula, Nepal; **Client:** DoR/WB IDA Grant No. H339-NEP; **Main Project Features:** Feasibility study and construction supervision of roads; **Position Held:** Field Research Supervisor; **Activities Performed:** Develop research tools for Socio-economic Baseline Study and Resettlement Action Plan Study, Provide research training to the field staff, Organize field study and mobilize field research team, Monitor and supervise field study team, Public consultation for need identification, Prepare Resettlement Action Plan (acquisition compensation resettlement plan for road projects based on affected people/families), Prepare Socio-Economic Baseline Study report, Provide information to all relevant

social matters related to the project as per WB guidelines (Environmental and social Management framework Developed by Department of Road/ International Development Agency) of following roads:

- Kalagad – Chainpur Road (50km),
- Gokuleswor – Thaktoli – Darchula (72km) Road,
- Shitapati – Musikot Road (86km) (2 times)
- Gokuleswor – Thaktoli – Darchula Road
- Khidkijual to Manma – Jumla road(109km)

Name of Project or Assignment: Rainbow F.M.; **Year:** September 2009 to 5th May 2010; **Location:** Kathmandu, Nepal; **Client:** Rainbow F.M.; **Main Project Features:** Creating the various marketing & research about FM programme; **Position Held:** Marketing Manager; **Activities Performed:** Responsibility for advertising customer, related to the sales and marketing, advertisement, Marketing, Business promotion, Prepare the Daily, Weekly Programs, To do Marketing Survey in different places & Agency, Trainings, attended Seminars, Workshop & Trainings and care to customers.

Name of Project or Assignment: District Development Committee; **Year:** May 2005 to July 2006; **Location:** Dang; **Client:** District Development Committee; **Main Project Features:** Information of DDC; **Position Held:** Information Assistant; **Activities Performed:** Overall team management, liaison with the client, Preparation of checklist and questionnaire, Collection of primary/secondary data and processing, Analysis of socio-economic aspects, Collaborate with VDC residents in identification of the necessary projects, Projection for future developments, Preparation of VDC profiles, Focus Group Discussion, Report preparation and presentation.

Name of Project or Assignment: Sunrise Rosin and Turpentine Pvt. Ltd; **Year:** July 2004 to May 2005; **Location:** Sunsari; **Client:** Sunrise Rosin and Turpentine Pvt. Ltd; **Main Project Features:** Preserve the jungle and slide protection works; **Position Held:** Public Hearing Officer; **Activities Performed:** Formation local users groups as such V.D.C's and inform them about Environment impact assessment report. Responsibility for protection of fire in jungle and save the mother trees.

Name of Project or Assignment: Bhawani Chemicals Pvt. Ltd.; **Year:** January 2004 to May 2004; **Location:** GetaKai Bhawani Chemicals Pvt. Ltd; **Main Project Features:** Socio researcher; **Position Held:** Socio-Economic researcher; **Performed:** Responsibility for base line survey (sociological and culture) for Environmental Impact Assessment.

Name of Project or Assignment: Geological and Engineering Consultancy Pvt. Ltd.; **Year:** December 2002 to December 2003; **Location:** Kathmandu; **Client:** Geological and Engineering Consultancy Pvt. Ltd; **Main Project Features:** Management of office; **Position Held:** Manager; **Activities Performed:** Responsibility for office management and Gokulesowr to Bitule Chamiliya dam access road (17km).

Name of Project or Assignment: Public Progress Society Development Centre (PPSDC); **Year:** July 1998 to November 2002; **Location:** Dang; **Client:** Public Progress Society Development Centre (PPSDC); **Main Project Features:** Office work; **Position Held:** Secretary; **Activities Performed:** Responsibility for coordinate to National and International expertise.

14. Certification:

I, the undersigned, certify that to the best of my knowledge and belief, these data correctly describe me, my qualifications, and my experience.



[Signature of staff member]

Full name of staff member: Subash Chandra Ghimire

Date: 14/08/2022
Day/Month/Year



FORM TECH=6B CURRICULUM VITAE (CV)

| | | | | | |
|-----|--|---|---|---|---|
| 1. | Proposed Position: | Road Design Engineer-1 | | | |
| 2. | Name of Firm: | Soil Test (P) Ltd. | | | |
| 3. | Name of Expert: | Shashi Shrestha | | | |
| 4. | Current Residential Address: | Lalitpur, Nepal | | | |
| | Telephone No.: | 9841036360 | | | |
| | E-Mail Address: | shr_shashi@yahoo.com | | | |
| 5. | Date of Birth: | May 21, 1978 | | | |
| | Citizenship: | Nepali | | | |
| 6. | Education: | <ul style="list-style-type: none"> Master in Transport Engineering, Institute of Engineering Pulchowk Campus, Pulchowk, Lalitpur 2015 Bachelor in Engineering (Civil), Institute of Engineering, Pulchowk Campus, Pulchowk, Lalitpur, 2001 | | | |
| 7. | Membership in Professional Associations: | <ul style="list-style-type: none"> Member, Nepal Engineers' Association Member, Nepal Engineering Council (4675 Civil "A") | | | |
| 8. | Other Trainings: | <ul style="list-style-type: none"> MS Word, MS Excel, Pagemaker, dBase, III+/Foxpro, Photoshop, GW BASIC, C++, FORTRAN, Auto CAD and Auto LISP-2000, Microfeap II, SAP 90, Internet and e-mail, "Softwel" - A Highway Design Software Two months on-the-job training on application of SW_ROADS, SW_DTM., Apr – May, 2001 | | | |
| 9. | Counties of Work Experience: | Nepal | | | |
| 10. | Languages | Nepal Bhasa English Nepali Hindi | Speaking Mother Tongue Excellent Excellent Good | Reading Excellent Excellent Good | Writing Excellent Excellent Good |
| 11. | Employment Record | From [Month/Year]: To [Month/Year]: Employer: Position held: | June, 2001 date Soil Test (P) Ltd Highway Engineer | | |

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| 12. Detailed Tasks Assigned on consultant's Team of Experts: <ul style="list-style-type: none"> Overall management of the DPR Consultant team Lead the teams carrying out feasibility survey, Transect walk Survey, baseline survey including video graphing roads and bridges as specified in the TOR. Coordinate RCIP/PCU/PIU, DoLI, IDO of provincial government. Organize community consultation together with PIU and ward representative of Rural Municipality/ Municipality and hold consultation meetings with the local community to sort out issues of land availability for widening etc. Organize the Transect Survey along with the PCU/PIUs staffs, | 13. Work Undertaken that Best Illustrates Capability to Handle the Tasks Assigned <p>Project Name: SASEC Road Connectivity Project, Project Preparatory Consultants funded by ADB</p> <p>Year: April 2018 to date</p> <p>Location: Nepal</p> <p>Client: DOR</p> <p>Main Project Features: Detailed Design of Roads</p> <p>Position Held : Highway Engineer</p> <p>Activities Performed: Responsible of monitoring traffic survey and detailed design of following roads :</p> <ul style="list-style-type: none"> Thimura-Muglin new alignment along right bank of Trishuli River: L=27km, 2Lane Mahendra Highway (Lauki – Kanchanpur): L=15km, 4Lane Mahendra Highway (Kanchanpur-Kamala) : L=85km, 4Lane Malekhu – Lothar Road: L=40km, 2Lane Mirchaiya– Katari – Ghurmi Road: L=75km, 2Lane Dumre – Besisahar: L=43km, 2Lane, Existing design to be reviewed and revised <p>Name of assignment or Project: Road Improvement Project Package "F"</p> <p>Year: July 2014 to Mar 2018</p> |
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Ministry of Transport, Road and Transport Development
 Road Design and Construction Division
 Project Coordination Unit
 Lalitpur



Ministry of Federal Affairs and General Administration
 Government of Nepal
 Singha Durbar, Kathmandu

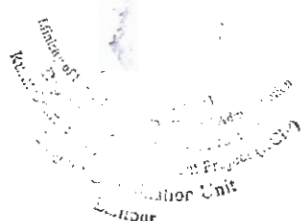
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| <p>environmental specialist, social specialist, social Mobilizer and other relevant staff accompanied by the project beneficiaries and affected people on the road</p> <ul style="list-style-type: none"> ◆ Co-ordinate social and environmental studies with relevant experts. ◆ Organize Conducting existing pavement condition survey and preparation of road inventory database and digital mapping of the project roads ◆ Organize and supervise carrying out baseline conditions survey of selected roads geometric features, type and condition of drainage structures, pavement strength, and other major features; determine residual life, and prepare schedules of road structures. ◆ Organize and supervise preparing an inventory and conduct detailed condition surveys for bridges and other cross drainage structures ◆ Assist Conducting traffic studies and analysis data for future forecasting. <p>Organize and assist Identifying source, location, availability and suitability of construction materials.</p> <ul style="list-style-type: none"> ◆ Assist to Conduct a detailed soil and material survey for pavement design and prepare quarry charts and reports. ◆ Lead to Conduct topographic survey of all project roads for collecting all information for detailed designing the works ◆ Lead to conduct soil and pavement investigations required for detailed engineering designs. ◆ Lead to Carry out sub-soil investigations bridge sites and if necessary at culverts sites and slope protection sites ◆ Lead to Carry out the hydrological and hydraulics analysis based on rainfall and flood records supplemented by field investigations for project roads and bridges. ◆ Carry out detailed engineering design for project roads ◆ Lead to Carry out detailed engineering design for the bridge structures and causeways along the road corridor ◆ Lead to prepare engineering drawings, including road plans, longitudinal profiles, horizontal and vertical profiles, cross-sections, structure plans, and | <p>Location: Nepal Client: DOR Main Project Features: detailed engineering survey Position Held : Highway / Assistant Resident Engineer Activities Performed: Carried out joint detailed engineering survey with the Contractor using total station and Differential GPS system, Processed survey data and prepared Digital terrain model using SW-DTM software for Bhaktapur-Nagarkot-Sipaghat Road (41 Km) and Bharatpur – Rampur Road</p> <hr/> <p>Project Name: Pokhara – Seven Lakes Tourist Road (30.36 km) Year: Jan 2014 to July 2014 Location: Pokhara Client: DOR Main Project Features: Detailed design of Roads Position Held : Highway Engineer Activities Performed: Detailed design of Pokhara – Seven Lakes Tourist Road (30.36 km).</p> <hr/> <p>Name of assignment or Project: Road Improvement Project Year: Feb 2013 to Dec 2013 Location: Nepal Client: DOR Main Project Feature: Detailed design of Roads Position Held: Highway Engineer Activities Performed: Responsible for detailed design of following roads for Department of Roads : <ul style="list-style-type: none"> • Shahid Marg in Rolpa and Dang District (103 km) • Balaju-Ranipauwa-Kakani-Trisuli Road (75 Km) • Bhaktapur-Nagarkot-Sipaghat Road (41 Km) </p> <hr/> <p>Name of assignment or Project: Road Connectivity Sector Project (funded by ADB) Year: Aug 2011 to Jan 2013 Location: Nepal Client: DOR Main Project Feature: Checking of invoices submitted by the Contractors Position Held: Civil / Road Engineer Activities Performed: Responsible for checking of invoices submitted by the Contractors of following road and bridges : <ul style="list-style-type: none"> • Phidim – Taplejung Road Project (Project Cost : NRs. 1,059.97 million) • Tamakoshi – Khurkot – Manthali Road Project (3 ICB Contract Packages; Project Cost : NRs. 1003.04 million) • Galchhi – Trisuli – Syafrubeshi Road Project (4 ICB Contract Packages; Project Cost : NRs. 1296.37million) • Dhalkebar – Janakpur Road Project (2 ICB Contract Packages; Project Cost : NRs. 520.38 million) • Sunkoshi Bridge Project and Approaches (1 ICB Contract package; Project Cost : 175.99 million) • Bhairahawa – Taulihawa Road Project (1 ICB Contract Package; Project Cost : NRs. 351.53 million) • Bhaktapur – Changu Narayan Road (Project Cost : NRs. 60 million) </p> <hr/> <p>Name of assignment or Project: Different Road and Bridge Project Year: Jan 2009 – to July 2011 Location: Nepal Client: DOR Main Project Feature: Cost estimate, preparation of map, plan & profile and cross-section using AutoCAD 12 and design of access road using SW_ROADS (Road Design Software) Position Held: Highway/Civil Engineer Activities Performed: Responsible for cost estimate, preparation of map, plan & profile and cross-section using AutoCAD 12 and design of access road using SW_ROADS (Road Design Software) for following bridges and access roads : <ul style="list-style-type: none"> • Bagmati River along Gairigaon - Jagritinagar Road in Kathmandu </p> |
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Department of Local Infrastructure
Rural Connectivity Improvement Project (RCIP)
Project Coordination Unit
Lalitpur

Joint Venture
New Baneshwor, Kathmandu

Ministry of Federal Affairs and Coordination
Government of Nepal
Singha Durbar, Kathmandu

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| <p>other requirements.</p> <ul style="list-style-type: none"> ◆ Lead to prepare detailed engineering designs for the road, bridge, pavement, and structures, and bills of quantities, and calculate detailed costs estimates for civil works. ◆ Lead to prepare cost estimate for proposed works based on the schedule of rates. For items not covered by scheduling the same be accompanied by the analysis. For adopting market rates for the detailed cost estimates, proper rate analysis should be carried out. ◆ Propose contract packaging and construction duration, taking into account (a) the location of the project roads, size of contracts, and other project-specific factors; and (b) ADB's Guidelines for Procurement. ◆ Lead to conduct road safety audits (RSAs) including mandatory field visits on 10% of the detailed design for roads with at least one road from each VDC. ◆ Lead to prepare concise RSA reports listing road safety issues and proposed measures to mitigate/address road safety issues. ◆ Lead to conduct follow up desk review of the final detailed design report to check how the issues identified in RSA are addressed. ◆ Prepare a report summarizing the findings and recommendations, and presenting the supporting data and analysis, for review by the Government and ADB. ◆ Undertake additional tasks as required by the RCIP/PCU of DOLL | <ul style="list-style-type: none"> • Likhu Khola along Ramechhap - Okhaldhunga Road in Ramechhap • Karmare Bagaincha River along Karmare Road in Dhading • Budhigandaki River along Bungkotghat Road in Dhading/Gorkha • Cheka Khola along Babiyabirta Road in Morang • Seuti Khola along Koshi Highway Road in Sunsari • Bagmati River along Danchhi Road in Kathmandu • Godavari Khola bridge at Bishnudol VDC Ward No. 8 Lalitpur • Angubhatta River along Mechi Highway Road in Jhapa • Jhilmile River along Mechi Highway Road in Jhapa • Gauriya River along Gwalduba - Khoharawa Road in Jhapa • Handiya River along Budhabare - Naxalbari Road in Jhapa • Handiya Khola along Mechi Highway Road in Jhapa • Deboniya Khola along Haldibari Road in Jhapa <p>Name of assignment or Project: Road Connectivity Sector Project (funded by ADB) Year: Mar 2008 to Dec 2008 Location: Nepal Client: DOR Main Project Features: Road design and safety studies Position Held : Traffic / Road Design Engineer Activities Performed: Responsible for preparing/analyzing the following aspects of Road Design and Safety Studies : • Design of Road • Analysis of Road Safety Barriers • Design of Intersections, Traffic Signs and Signals • Analyzing the positioning of Passing Zones from the Road Safety point of view. • Design of all the Road Markings like zebra crossings, overtaking zones, non-overtaking zones, etc. Roads Involved: I. *Outer Ring Road – Kolphu, II. *Harkapur – Okhaldhunga (41 km), III. *Okhaldhunga – Salleri (58 km) II. *Hilepani – Diktal (40 km) III. Dhalkebar – Janakpur (20 km) IV. Bhaktapur – Changunarayan (6 km) V. *Khudi – Chame VI. Bhairahawa – Taulihawa (48 km) * These roads are not constructed either due to insufficiency of Budgets or the roads being infeasible.</p> <p>Name of assignment or Project: Road Sector Development Project Year: Nov 2007 to Feb 2008 Location: Surkhet - Kalikot Client: DOR Main Project Features: Designing the roads and responsible for preparation of map, plan & profile and cross-section using AutoCAD 12 and a SW_ROADS (Road Design Software) Position Held: Road Design Engineer Activities Performed: Assisted Sr. Highway Engineer for designing the roads and responsible for preparation of map, plan & profile and cross-section using AutoCAD 12 and a SW_ROADS (Road Design Software) for design of Surkhet - Kalikot Road (135 km).</p> |
| <p>Name of assignment or Project: Road Improvement Project Year: Apr 2007 to Oct 2007 Location: Nepal Client: Department of Roads Main Project Features: Detailed design of roads Position Held: Highway Engineer Activities Performed: Responsible for design of following roads : • Tulsipur – Salyan Road (61 km), • Surkhet – Dailekh Road (67 km)</p> | |
| <p>Name of assignment or Project: Traffic, Surface Distress and Road Roughness Survey on Strategic Road Network 2007 Year: Mar 2007 – Apr 2007 Location: Nepal Client: DOR Main Project Features: Traffic, Surface Distress and Road Roughness Survey</p> | |



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| Position Held: Civil Engineer Activities Performed: Responsible for Traffic, Surface Distress and Road Roughness Survey on Strategic Road Network 2007 |
| Name of assignment or Project: Nakchenangla – Gomgadhi Rural Road (90 km), Year: July 2006 to Mar 2007 Location: Nepal Client: DOR Main Project Features: Detailed design of roads Position Held: Team Leader/Highway Engineer Activities Performed: Responsible for designing the roads including preparation of map, plan & profile and cross-section using AutoCAD 12 and a SW_ROADS (Road Design Software) for design of Nakchenangla – Gomgadhi Rural Road. |
| Name of assignment or Project: Sindhuli Bardibas Road Project (35 km) Year: Feb 2006 – Jun 2006 Location: Sindhuli Bardibas Client: DOR Main Project Features: Detailed design of roads Position Held: Highway Engineer Activities Performed: Responsible for traffic survey, interpretation of data design of road and preparation of map, plan & profile and cross-section using AutoCAD 12 and a SW_ROADS (Road Design Software) for design of Sindhuli – Bardibas Road roads. The design aspect also include the road safety requirement, improvement of black-spot based on analysis of existing data base on road accident, cross-sections and safer side drains. |
| Name of assignment or Project: Dadeldhura – Patan - Satbanjh Road Project (54 km) Year: Sep 2005 – Jan 2006 Location: Dadeldhura – Patan - Satbanjh Client: DOR Main Project Features: Detailed design of roads Position Held: Highway Engineer Activities Performed: Responsible for traffic survey, interpretation of data, design of road, preparation of plan & profile and cross-section using AutoCAD 12 and a SW_ROADS (Road Design Software) for design. |
| Name of assignment or Project: Ishibu – Sankranti Bazaar Rural Road Project (40 km) and Myanglung – Ishibu Rural Road Project (40 km) Year: Oct 2004 – Aug 2005 Location: Nepal Client: DOR Main Project Features: Detailed design of roads Position Held: Team Leader (Design phase) Activities Performed: Responsible for survey and design including preparation of map, plan & profile and cross-section using AutoCAD 12 and a SW_ROADS (Road Design Software) |
| Name of assignment or Project: Basantapur – Myanglung Feeder Road Project (26 km) Year: July 2004 – Sep 2004 Location: Basantapur – Myanglung Client: DOR Main Project Features: Detailed design of roads Position Held: Highway Engineer Activities Performed: Responsible for preparation of map, plan & profile and cross-section using AutoCAD 12 and a SW_ROADS (Road Design Software) for design of Basantapur – Myanglung Feeder Road. |
| Name of assignment or Project: Kanti Rajpath Improvement Project (86 km) Year: May 2003 – Oct 2003 Location: Kathmandu Client: DOR Main Project Features: Responsible for monitoring (i) survey, design (ii) Road Traffic Volume Survey (iii) Intersection Traffic Volume Survey (iv) Origin Destination Survey etc. Position Held: Highway/Traffic/ Road Safety Engineer Activities Performed: Responsible for monitoring (i) survey, design (ii) Road Traffic Volume Survey (iii) Intersection Traffic Volume Survey (iv) Origin Destination Survey etc. for Kanti Rajpath Improvement Project. |
| Name of assignment or Project: Bannala Bridge Year: Nov 2002 – Mar 2003 Location: Nepal Client: DOR Main Project Features: Detailed design of bridge and access road Position Held: Road Engineer |

Ministry of Federal Affairs and Local Development
 Department of Local Infrastructure
 Rural Connectivity Improvement Project (2007-2010)
 Project Coordination Unit
 Lalitpur



Activities Performed: Responsible for preparation of map, plan & profile and cross-section using AutoCAD 12 and SW_ROADS (Road Design Software) for designing access Road of Bannala Bridge.

Name of assignment or Project: Pokhara Ring Road Project (85 km)

Year: Jan 2002 – Oct 2002

Location: Nepal

Client: DOR

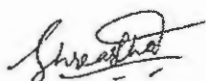
Main Project Features: Detailed design of road

Position Held: Road Engineer

Activities Performed: Responsible for survey and design including preparation of map, plan & profile and cross-section using AutoCAD 12 and a SW_ROADS (Road Design Software).

14 Certification:

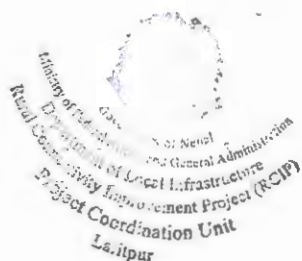
I, the undersigned, certify that to the best of my knowledge and belief, these data correctly describe me, my qualifications, and my experience.



Date: 14/08/2022
Day/Month/Year

[Signature of staff member]

Full name of staff member: Shashi Shrestha



CURRICULUM VITAE (CV) FOR NATIONAL EXPERT

1. Proposed Position : Geotechnical Engineer
2. Name of Firm : CARD Consult P. Ltd
3. Name of Expert : Mr. Deepak Chhetri
4. Current Residential Address : Kathmandu
Telephone No. : 9851095008
Fax. No. : NA
E-Mail Address : deepak@cardconsult.com.np
5. Date of Birth : 25th November 1980
Citizenship : Nepalese
6. Education:
 - M.Sc. (Geotechnical Engineering), Saitama University, Japan, 2011.
 - B.E. (Civil Engineering), Pulchowk Campus, Institute of Engineering, TU, Nepal, 2003.
7. Membership in Professional Associations:
 - Nepal Engineers' Association, member.
 - Nepal Engineering Council, Civil 'A' 3412.
8. Other Trainings
 - SAP Analysis, Arc View/GIS, AutoCAD organized by Continuing Education Centre, Pulchowk Engineering Campus, IOE, Nepal
 - "SW_DTM (Digital Terrain Modeling)" during Job training program organized by Welink Consultant Pvt. Ltd., Nepal
 - "SW Road" during Job training program organized by Welink Consultant Pvt. Ltd., Nepal
9. Countries of Work Experience: Nepal.
10. Languages:

| LANGUAGES | Speaking | | | Reading | | | Writing | | |
|-----------|----------|------|------|---------|------|------|---------|------|------|
| | Good | Fair | Poor | Good | Fair | Poor | Good | Fair | Poor |
| English | O | | | O | | | O | | |
| Nepali | O | | | O | | | O | | |
| Hindi | O | | | O | | | | O | |

11. Employment Record:

| | | | |
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| From | June 2008 | To | Till Date (Intermittent) |
| Employer | CARD Consult (P) Ltd. | | |
| Position held | Director/Geotechnical/Material/Pavement Engineer/Civil Engineer Ref: Mr. Bishnu Kumar Prajapati, Chairman, Tel: +977-1-4224141 | | |
| From | August 2018 | To | April 2019 (9 Months Intermittent) |
| Employer | ADP Ingenierie Private Limited, France | | |
| Position held | Geotechnical/Material Engineer For Reference: xavier.jouanin@adp-i.com, Name: Xavier JOUANIN, Acting Team Leader | | |
| From | February 2015 | To | August 2017 (12 Month Intermittent) |
| Employer | Kunhwa Engineering & Consulting Co., Ltd., Korea in association i with ERM | | |
| Position held | Geotechnical/Material Engineer Ref: Mr. Udhav Raj Chaulagain/ MD, ERM, Tel: +977-01-4483064; 9851036653 E-mail: uddabchaulagain@gmail.com | | |
| From | September 2015 | To | February 2018 (9 Months Intermittent) |
| Employer | ERM (P) Ltd. | | |
| Position held | Material Engineer/Pavement Engineer Ref: Mr. Udhav Raj Chaulagain/ MD, ERM, Tel: +977-01-4483064; 9851036653 E-mail: uddabchaulagain@gmail.com | | |
| From | November, 2015 | To | June 2016 (8 months) |
| Employer | UK Department for International Development (DFID), DAI Europe Ltd. | | |
| Position held | Geotechnical/Material Engineer For Reference: christian.haussner@evidenceondemand.or Name: Christian Haussner, Business Manager | | |
| From | October, 2013 | To | September 2014 (6 Months Intermittent) |
| Employer | Adel Al-Obaid Engineering Consultants, Kuwait, and HAMZA ASSOCIATES in association with Multi Disciplinary Consultants (P) Ltd. and Total Management Services Pvt. Ltd. (TMS) | | |

| | | | |
|---------------|---|----|------------------------------------|
| Position held | Material/Pavement Engineer Ref : Mr. Madhukar Bhatachan, Project coordinator, Tel: +9851243392 | | |
| From | March 2013 | To | September 2013 (7 months) |
| Employer | UK Department for International Development (DFID), HTSPE Limited and IMC Worldwide Limited | | |
| Position held | Geotechnical/Material Engineer For Reference: Mr. Biswo Ulag, Business Manager Tel: 9841456477 Mail: biswo.ulag@gmail.com | | |
| From | November 2012 | To | March 2014 (9 Months Intermittent) |
| Employer | M/s SNC-LAVALIN International Inc. (Canada) in association with SPAN Pvt. Ltd.. India, SILT and ERM (P) Ltd., Nepal | | |
| Position held | Material/Pavement Engineer Ref : Mr. Udhav Raj Chaulagain/ MD, ERM, Tel: +977-01-4483064; 9851036653 E-mail: uddabchaulagain@gmail.com | | |
| From | April 2003 | To | June 2008 |
| Employer | WELINK Consultants (P) Ltd. | | |
| Position held | Design Engineer/Geotechnical Engineer/Civil engineer Ref: Bipul Raj Joshi/ Director, WELINK, Phone No.: +9851098848 | | |

12. Detailed Tasks Assigned.

- Investigate, test, and define sources of construction materials;
- Assess the sources of natural construction materials (e.g., quarry sites), carry out suitability tests,
- prepare a materials report for the contractors' information

13. Works Undertaken That best Illustrates Capability to Handle the Tasks Assigned.

Name of Project or Assignment: Detail Engineering Survey, Engineering Design of various roads, road side structures, Bridges, access roads and other infrastructure projects; **Month and Year:** June 2008 to Till Date; **Location:** Nepal; **Client:** Government Agencies and Funding Donor Agencies; **Main Project Features:** Detail Engineering survey, design, soil investigations as per the standard codes of practice, norms and guidelines, Construction material survey and define quarry site for roads, bridges and other Infrastructure Projects; **Position Held:** Director/Geotechnical/Material/Pavement Engineer; **Activities Performed:** Responsible for Detail Engineering survey, design of foundation and substructure for minor, medium, major bridges, crossing structures, cross drainage structures, Retaining structures and other road side structure, Conduct sub-soil investigations; Investigate, test, and define sources of construction materials; Assess the sources of natural construction materials, carry out suitability tests, prepare a materials report for the contractors' information, test pits investigations, DCP, CBR, Axial Load test for Pavement design of roads, Detailed quantity estimate for all the structures, Relevant report preparation. The list of project that were carried out are as follows;

Bridges:

- Lakila Mahadev Khola RCC Slab Culvert of 6m Span, Lakila to Jyotirlingeshwor temple road, Changunarayan Municipality-3, Bhaktapur
- Jyotirlingeshwor Mahadev Khola RCC Slab Culvert of 6m Span, Pakunepati To Jyotirlingeshwor Road, Changunarayan Municipality-3, Bhaktapur
- Sunkoshi Bridge (Arch Bridge, 80m Span + 20m RCC Bridge), at Phoksingtar on Sagarmatha Highway Udayapur-Khotang for Gauri Parbati / Y P construction -JV, Kalanki-14, Kathmandu
- Marsyangdi Nadi Bridge Bridge (Prestressed, 2 span of 43m each with and pile foundation for pier Total Length 90m), connecting Turture Gorkha and Tanahu district for Gauri-Parbati Niman Sewa (P) Ltd., Kalanki-14, Kathmandu
- Bagmati River Bridge at Sinamangal for Kankai-Diwa JV, Satdobato, Lalitpur
- Dodha River Bridge (Prestressed Box Girder of each span 48m Total No. of Span 6 and pile foundation for pier, Total Length 300m), Kanchanpur Nardagaun-Balmi Road for ANK-YP-Him Sagarmatha JV, Lalitpur
- Seti River Bridge (Steel Arch Bridge of 80m Single Span) Connecting Pokhara 3-11 (Nadipur - Phoolbari), for HIRACHAN / MUKTINATH JV, Pokhara - 7, Kaski
- Tamakoshi Bridge (Arch Bridge, 60m Span) at Gumu, Dolakha for Kanaki International Builders
- Dima Khola bridge, Kukurdhama Bridge, Belauti River Bridge, Bimala Bridge Bridge, Multicell Culvert Bridge(Ganguli - Nabatoli), Multicell Culvert Bridge(Nagarain - Phulagama), Multicell Culvert Bridge (Phulagama - Haspatti), KotkuKhola Bridge, Shera Kholama Culvert at Spatari and Dhanusa
- Birdhana Khola Bridge, Chapini Khola Bridge, Chimti Khola Bridge, Debdhar Khola Bridge, Hardiya Khola Bridge, Judi Khola Bridge, Kharak Khola Bridge, Murkatuwa Khola Bridge at Udayapur
- Single span Truss Bridge of Koshi West Canal at Panchawari, Nargho-9 in between Belhicapena and Banainiya located 16km south from Traffic Chowk of East West Highway
- Nijangad River bridge at Chhapari VDC, Darchula
- Belauti River at India Nepal Border in Dhanauji, Tarahi V.D.C, Bimala River at border of Duhabi and Itaharwa VDC, Dima Khola at Ramnagar Mirchaiya Municipality, Rampur Birta adjoining Ward No 4 & 5, Minor Bridge along Ganguli Nabatoli Road, Kotpu Khola Bridge at Balkumari Corridor, Minor Bridge over Kukurdharma Nala at Nagarain VDC, Minor Bridge along Nagarain Phulgama Road, Minor Bridge over Phulgama Haspatti Road, Dhula khola Bridge, Mahottari, , Banke Nadi Bridge, Mahottari, , Gholuwa Nala Bridge, Bardiya, , Satariya Nala Bridge, Bardiya, , Kanjariya Bridge, Bardiya, DOR, Jangha Nadi Bridge (Prestressed), Mahottari
- Mornia Nala Bridge at Kailali district, Ultti Khola Bridge at Nawalparashi, Bagmati River Bridge at Tinkune, Kagiya Khola Bridge, Dhanusha, Rupeni Khola Mahottari, Tipari Khola bridge Dailekh District, Harpur Khola, Bash Khola, Litti Khola, Adheri Khola, Bankatti Khola and Siseniya Khola Bridge in Nawalparashi
- Budhi Rapti Bridge at Seti Churot, Ladari Bridge at Gotheshwor, Sakti Khola Bridge at Shaktikhor, Chatara Khola Bridge at Pakhribas, Chitwan

Roads

- Timbu Doring Nokate Road, Sindhupalchok (24.466 Km)
- Dailekh Bajar Dekhi Unnapata Section of Dailekh Bajar Mahabub Kalkot Sadak, Dailekh, 30 Km
- Resunga Koridor, Gulmi, 14 Km

- Jogbuda Rupayal Bhageshwarhudai Melauli Sadak, Dadeldhura, 18km
 - Sadakpur Bauniya Jhabahi Tapapur Mohana (Mariyaghat) Bhansar Road, Kailali, 30 Km
 - Bayarghari- Banethok-Deurali-Biruwa Sadak, Syangja, 19km
 - Tillotamma Ring Road (Shankarnagar-Karhiya-Makrahar-Gangoliya-Madhalya-Tikuligadh-Aanandaban-Shankarnagar), Rupendehi, 46Km
 - Tansen Chandibhanjyang Jorte Ridi Sadak, Palpa, 25Km
 - Rijal chowk Amarbhumi Majkharkadarma Bhaise Midhill sadak, 30 km
 - Tamaghas-Sandikkharkha Section (43.2 Km)
 - Sandikkharkha-Gorusinghe Section (67.8 Km)
 - Manakamana Phikuri Satdobato Kaule Bhalche Saalma Road, Nuwakot (33.14 Km)
 - Tansen Ringroad – Berangdi - Khanigaun – Dailatum, Syangja, Palpa, (13.215 Km)
 - Nagtar – Heltar Sadak, Lalitpur (30.59 Km)
 - Dumja Marinkhola Kapilkot Lalbandi Sadak, Sindhuli, Sarlahi (58.11 Km).
 - Helu – Arjunchapuri – Rapakot Naudanda – Karkina Badkhola – Taxar – Dulegauda Mirdi – Jagatbhanjyang Walling – Huwas Rural Road. (Length 41 Km).
 - N-S Lokmarga Mahakali Corridor (Tanakpur Jhulaghat Darchala) (45.465 Km).
 - Jyagdi Corridor Road. (Length 32.173 Km).
 - Beluwa chowk to Karnali Bridge, Bardiya District. (Length 23 Km)
 - Six lane Birjung Pathalaya Road to ICP (Parmanipur to Sirsiya dry port) (10.935 Km)
 - Jiri Sikri - Hawa Kirne Road, Dolkha, Ramechhap District (40.48 Km)
 - Dukuchap VDC - Debichaur Ghusele Malta Baguwa to Makawanpur (Kantilok path) (31.33 Km).
 - NawalparasiBishnunagarBulingtar (34.83 Km) and
 - Tanahnu Gomantal Bulingtar (25.88 Km)
 - Four (4) Lane Road of Janakpur - Jaleswor – Birtamod Road, Dhanusha and Mohatari District (18.75 Km)
 - Bhairagi Thati Kaeekhola Nuwakot Danda Kholagau Chaurjhari Road, Rukum (39.97 KM)
 - North South Lokmarga Mahakali Corridor. (Tanakpur-Jhulaghat-Darchala, Baitadi and Darchula District) (95.516 Km).
 - Kaligandaki Corridor (Gaindakot – Rampur – Pipaldanda), and, Nawalparasi and Palpa District, 130km
 - Pokhara Ring Road, Kaski District, (80.9Km)
 - North- South Highway, Tamakhosi Lamabagar Road Section (35 km)
 - North- South Highway, Khadbari Kimathanka Road Section (115 km)
 - North- South Highway, Khadbari Kimathanka Road (Dhiga of Hatiya VDC – Chumsur - Kimathanka Section) (50 km).
 - Kamalamai Na. Pa. Ringroad, Sindhuli – Central Hill, (13Km)
 - Pyuthan Ringroad, Pyuthan – Mid-Western Hill, (32Km)
 - Jhimruk Ringroad, Pyuthan – Mid-Western Hill, (51Km)
- Total Approx. Consulting Cost including all the projects: NRs 220 Million

Name of assignment or project: Air Transport Preparatory Consultant, Transport Project Preparatory Facility Project, Financed by ADB; **Month and Year:** August 2018 to April 2019 (9 Month Intermittent); **Location:** Kathmandu, Nepal; **Client:** Civil Aviation Authority of Nepal (CAAN); **Main project features:** Geotechnical Investigation, Drilling, Coring, Test Pits, Soil Sampling, laboratory Test and Field Rest, Report Preparation for Tribhuvan International Airport for Remote International Apron, Domestic Apron, Parallel Taxi, Remote Domestic Apron and Nepal Army area **Positions held:** Geotechnical/Material Engineer; **Activities Performed:** Sub-soil investigations, monitoring coring and SPT drilling works, Test Pits analysis, Disturbed and Undisturbed Sampling of Soil, Field Test and Laboratory Test for Soil Parameters for design aspect, test, and define sources of construction materials; Assess the sources of natural construction materials, carry out suitability tests, prepare report for the designer's information; Consulting Fees (approx.) US\$ 0.08 million

Name of assignment or project: Feasibility Study and Detailed Design for Construction of New Bridges and Maintenance of Existing Bridges along RSDP Road financing by World Bank & Department of Roads; **Month and Year:** February 2015 to August 2017 (12 Month Intermittent); **Location:** Various Places in Nepal; **Client:** World Bank, DoR (Kunhwa Engineering & Consulting Co., Ltd., Korea); **Main project features:** Detail Design of slope stabilization, retaining structures of access roads and Bridges in Surkhet – Jumla Road (Tila Khola Bridge Truss-single span 60m), and Narayanghat – Mungling Highway Khani Khola Bridge (25m), Mauri Khola Bridge (15m), Das Dhunga Khola Bridge (15m); Jalbire Bridge (80m) **Positions held:** Geotechnical/Material Engineer; **Activities Performed:** Detailed survey and sub-soil investigations, Investigate, test, and define sources of construction materials; Assess the sources of natural construction materials, carry out suitability tests, prepare a materials report for the contractors information; Project Cost (approx.): US\$ 90 million; Consulting Fees (approx.) US\$ 1.5 million;

Name of assignment or Project - Road Improvement Project Phase III (Ranke-Rabi Bhendetar Road - 90km and Charikot-Tamakoshi-Jiri Road - 55km) (Double Lane-Bituminous) Contract No.: RIP-III/3371334/CS-001/71/72) financed by Exim Bank of India; Month and Year - September 2015 to February 2018 (9 Months Intermittent); Location - Terathum & Dolakha, District, Nepal; Client - Department of Roads / EXIM Bank of India; Main project features - Overall project management, design of road works; Position held - Material/Pavement Engineer; Activities performed - Investigate, test, and define sources of construction materials; Assess the sources of natural construction materials, carry out suitability tests, prepare a materials report for the contractors information; Total Project Cost (approx.): US\$ 46.5 million; Consulting Fees (approx.) US\$ 4.2 million;

Name of Assignment or Project: Restoration of local government services in earthquake affected districts through LGCDP; **Month and Year:** November, 2015 to June 2016 (8 months); **Location:** Various Districts of Nepal; **Client:** Dolidar/ GoN Funded by DFID, Nepal, **Employer:** UK Department for International Development (DFID), DAI Europe Ltd.; **Main Project Features:** Prepare construction material specifications manuals, organize trainings for engineers, masons and building artisans, Setup Mechanism for overall Quality Control of material selection and uses; **Position Held:** Geotechnical/Material Engineer; **Activities Performed:** Restoration of local government services in earthquake affected districts

through LGCDP; In consultation with the Government of Nepal, contribute to the development of Permanent structure reconstruction aspect in the pro-doc. In line with the recovery framework as part of a wider recovery programme provide details operational mechanism to deliver financial and technical assistance to implement public construction works. Suggest modalities for implementation of the public infrastructure programme, design, financial assistance, modalities for disbursement. Assist in developing VDC office building construction and suggest improvements in settlement planning. Provide technical inputs into the documents on building materials and construction technology by using local materials. Suggest improvements at the level of settlements, including the provision of office infrastructure. Provide details mechanism for Coordination with technical teams, and suggest arrangements for technical support and oversight of actual reconstruction. Provide concrete suggestion to setting up of technical teams who can provide technical assistance to the construction phase on ground. Technical assistance should include sound construction practices, seismically safe design, and inclusion of basic amenities. Suggest arrangements for periodic monitoring and oversight of the actual process of reconstruction. Provide concrete ways to organize trainings for engineers, masons and building artisans. Provide inputs into the documents on organizing training of engineers, masons and artisans in safe construction practices. Coordinate with technical institutions to organize technical training programmes. Suggest technical quality assurance services mechanism. Provide clear strategy in the document on engineering and technical services for quality assurance of the reconstruction. Set up mechanisms for external feedback on overall quality of reconstruction. Consulting Cost (Approx.): US\$ 2.13 Million

Name of assignment or Project - Consulting Services For Feasibility Study and Detailed Engineering Design of (Sitapaila-Dharke) Road, Kuwait Fund (Contract No.: 01-KWT/2068/69); **Month and Year** – October 2013 to September 2014 (6 Months Intermittent); **Location** – Nepal; **Client** - Department of Roads; **Main project features** - Feasibility Study for Stretch of the Road from Kathmandu (Ring road) to Dharke (Dhading District) considering engineering, economics, social, resettlement & environmental aspects; Detailed Engineering Survey and Design for preferred alignment (35km) with preliminary estimate of the 360m length tunnel including preparation of BID document; Detailed Engineering Survey and Design of eight (8) bridges. (Double Lane – Bituminous Road) of Sitapaila-Dharke; **Position held** – Material/Pavement Engineer; **Activities performed** - Investigate, test, and define sources of construction materials; Assess the sources of natural construction materials, carry out suitability tests, prepare a materials report for the contractors information. Total Project Cost (approx.) US\$ 50 million; Consulting Cost (approx.): US \$ 2.2 million;

Name of Assignment or Project: Implementation review report of RRRSD; **Month and Year:** March 2013 to September 2013 (7 months); **Location:** Various Districts of Nepal; **Client:** Dolidar/ GoN Funded by DFID, Nepal, **Employer:** UK Department for International Development (DFID), HTSPE Limited and IMC Worldwide Limited; **Main Project Features:** Review and carryout design if require for the designed road and road side structure and check the quality of projects at site featuring geotechnical and construction material aspect; **Position Held:** Geotechnical/Material Engineer **Activities performed:** Visited the 12 districts and review the documents of around 300 Km length of road in almost all district. Review the records of work inspections and quality control and monitoring with the assistance of the DPOs and their records and make comments on their completeness and compliance. Discuss and make recommendations to the DTOs on the effectiveness and practicality of the quality control activities for road, pavement and road side structure works. Review the operation and operational standards, based on available testing records, condition and range of equipment, knowledge and experience of the laboratory technicians of the labs for material testing and quality control of civil works including road, pavement and road side structure works. During the site visits advice on any issues or problems in connection of implementation and construction of the ongoing subprojects as is possible at local level. Identify any occurrence of or encountering any problems in the road construction in order for recommending future measures to resolve/prevent reoccurring problems. Carry out the inspection of road structures and road pavement, to assess any deficiencies in the quality and suggest rectification measures to be adopted. Review the frequency of on-site monitoring by local stakeholders and comment on the adequacy and suitability of the reporting system. Organize coordination and review meetings regularly with DPO and Contractor at site to achieve accelerated progress of road construction and resolve quality issues, if any. Compile a site visit report on the road progress for submission to PCU at set intervals. Review and report on the feasibility of successful completion of subprojects within the available contract timescale and suggest mitigation measures if necessary. Undertake additional tasks as required by the Team Leader Provide feedback and support for the preparation of Project Completion Report as instructed by the Team Leader. Consulting Cost (approx.): US\$ 5 Million

Name of assignment or Project - Consulting Services for Project Preparatory Consultant 1 for Road Component (PPC1 - Road – approx. 900 KM) of Transport Project Preparatory Facility (TPPF) with approx. 500 KM of Detail Design Study and more than 900 KM Feasibility Study of Road, ADB Grant No. 0227 – NEP; **Month and Year** - November 2012 to March 2014 (9 Months); **Location** – Nepal; **Client** - Department of Roads, Project Directorate (ADB); **Main project features** - Feasibility Study and Design of Road Component (PPC1 - Road – approx. 900 KM) of Transport Project Preparatory Facility (TPPF) with approx. 500 KM (Double lane Bituminous) of Detail Design Study and more than 900 KM Feasibility Study of Road; **Position held** – Material/Pavement Engineer; **Activities performed** – Investigate, test, and define sources of construction materials; Assess the sources of natural construction materials, carry out suitability tests, prepare a materials report for the contractors information of major road section.; Detailed Design Study of major roads (2 to 6 lane in different Sections) are as follows: Ramapur-Lumbini-Kakarhawa (34.57 KM), Leguwaghar-Bhojpur (65.48), Leguwaghat-Tumlingtar (Sabha Khola) – 24.63 KM, Feasibility study and detail design of bridges are as follows:: Seti-1 RCC T-Beam (32m); Seti-2 RCC T-Beam (40m); Total Project Cost: US\$ 65.23 million; Consulting Fees (approx.) US\$ 2.8 million;

Name of assignment or project: Design, Survey, cost estimate, Rate analysis of Detailed Engineering Survey, Soil Investigation, Hydrological Analysis and Detailed Design of 3 Bridge; **Month and Year:** From April 2003 To May 2008; **Location** – Nepal; **Client** - Department of Roads, Division Road Office; **Main Project Feature:** Design, Survey, cost estimate, Rate analysis of Detailed Engineering Survey, Soil Investigation, Hydrological Analysis and Detailed Design of 3 Bridge; Juligad, Kachaligad, Bhyagutegad along Khodpe Bajhang Road; **Position Held:** Geotechnical/Civil engineer; **Activities performed-** Detailed engineering survey, Soil Investigation, Construction Material Survey, Hydrological study, Detailed cost estimate, report preparation

Name of assignment or project: Design, Survey, cost estimate, Rate analysis of Detailed Engineering of Confluence of Seti-Myngde khola Bridge, Tanahu, Godavari Khola Bridge, Lalitpur and Sunkhoshi Khola Bridge, Ramechhap; **Month and Year:** From April 2003 To May 2008; **Location** – Nepal; **Client** - Department of Roads; **Main Project Feature:** Design, Survey, cost estimate, Rate analysis of Detailed Engineering of Confluence of Bridges; **Position Held:** Geotechnical/Civil Engineer; **Activities performed-** Detailed engineering survey, Soil Investigation, Construction Material Survey,



Hydrological study, Detailed cost estimate, report preparation

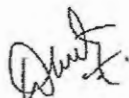
Name of assignment or project: Detailed Engineering Survey and Design of different road projects, **Month and Year:** From April 2003 To May 2008; **Location** – Nepal; **Client** - Department of Roads; **Main Project Feature:** Design Review and construction supervision for Road Maintenance and Development Project on different road projects: Lamahi – Kohalpur (109 km); Syaule – Dipayal (65 km); Sanfebagar – Mangalsen (39 km); Surkhet – Ranimatta – Dailekh (67 km); Tulsipur – Salyan (61 km); Chakchake – Liwang (63 km); Bhalubang – Pyuthan (67 km); **Position Held:** Civil engineer; **Activities performed-** Topographical survey of the area including all pertaining traversing, leveling and tachometry. Soil investigation. DCP Test, Construction Material Survey, Hydrological Investigation for the road related structure. Detailed Engineering Design consisting of Engineering Calculation, Drawings, Plans, Profiles, Cross-sections, Pavement, BoQ and Engineer's Cost

Name of assignment or project: Chamati Land Pooling Project, Kathmandu Metropolitan City Corporation, **Month and Year:** From November 2003 To June 2005; **Location** – Nepal; **Client** – DUDBC, New Town; **Main Project Feature:** Land pooling, Physical infrastructure design and layout; **Position Held:** Civil engineer; **Activities performed-** On the basis of the preliminary road network plan, prepared by the project office, detail planning & design of infrastructure of Chamati Land pooling Project Area, traffic flow and infrastructure demand calculation, proposal of population density for infrastructure design calculation, opinion surveys with stakeholders, survey of existing infrastructure and supply points, survey of proposed road and proposed utilities, detailed engineering design of all infrastructure, costing for phase wise development and preparation of detailed implementation plan for construction and bidding documents

Name of assignment or project: Urban Environment Improvement Project (UEIP), Bharatpur, Chitwan, **Month and Year:** From November 2003 To October 2008; **Location** – Nepal; **Client** –DUDBC, Bharatpur Municipality; **Main Project Feature-** Survey, Design and construction supervision for Urban Infrastructures such as drainage, water supply, treatment plants, road side structures, markets etc.; **Position Held:** Civil engineer; **Activities performed-** Detail Design, Working Drawings with Quantity Estimates and preparation of contract document including construction supervision; Separate Drainage and Sewerage System in the core area of city (10.15Km) Including Road Bed Treatment plant at Nagarband Area; Water Supply System at entire Municipality including new supply at Scheme II and III and support to old system at core area scheme I; River training at Narayani River Bank (1.5Km); (1240m Gabion Works and 260m RRM and RCC Works including sub-surface drain and outfall structures); Neighborhood Road, Drainage and Water Supply Sub Project (9.7 Km DBSD Road with drainage and water supply, including plotting of Land); Infrastructure development for urban facilities as: Central Bus park; (Premix Hot asphalt pavement of 11000sqm including infrastructure facilities as shop and workshop, boundary wall, storm drain, Pipe drain, Vegetable Market, Public Toilet etc.

14. Certification

I, the undersigned, certify that to the best of my knowledge and belief, these data correctly describe me, my qualifications, and my experience.



[Signature of staff member]

Full name of staff member: Deepak Chhetri

Date: 14/08/2022
Day/Month/Year

